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# PUBLIC LIBRARIES

## Their Value from Educational and Civic Standpoints—Promote the Best Interests of Municipalities—Methods and Cost

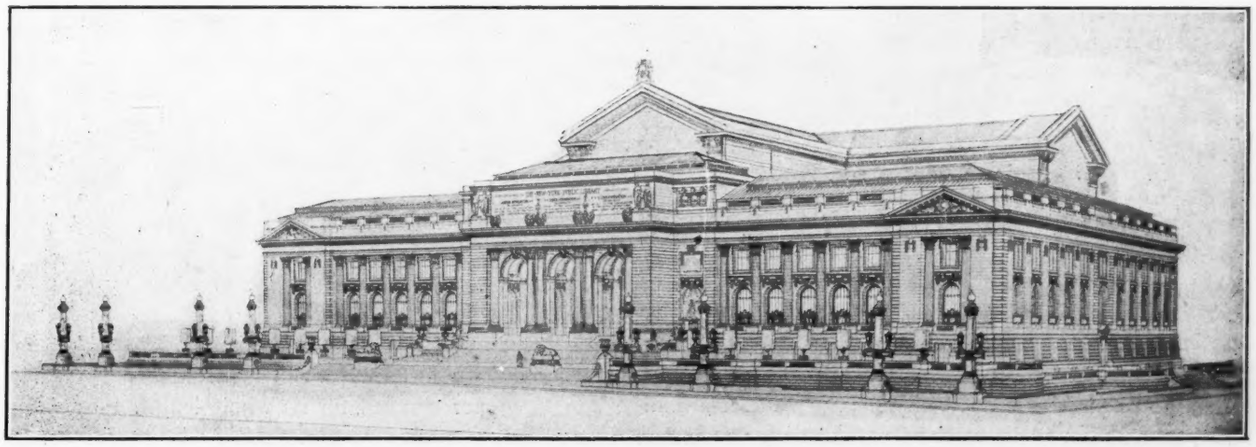
By W. P. HEYL

THE value of a library to a community is becoming more and more widely recognized, not only for its educational value, but for the fact that a library is the natural rallying place for all movements tending toward the best interests of the municipality. Civic associations gather there, showing that a "public library does diffuse sound principles of social and political actions." One of the inscriptions on the front of the Boston Public Library says, "The Commonwealth requires the education of the people as a safeguard of order and liberty." As the modern conception of the library spreads, it will be seen more and more that hardly any institution, not excepting the school and the church, is so potent in these directions.

When a municipality has decided how much money to spend upon a library, the first step is the acquisition of a site. This done, an invitation can be sent to architects to compete in the designing of a building to meet the requirements. The details of these requirements are becoming more and more important as the service of library administration becomes better known. Great economy of cost and increased convenience to the public are secured if an experienced librarian is called in at this time for consultation. As illustrating this point, it may be stated that the cost of running libraries, represented by the salaries paid to employees, etc., varies in different cities from 38 to 60 per cent. of the total amount appropriated.

From those who administer the city's affairs, one of the first questions will be, how much will it cost to construct a library and to maintain it when completed? As no definite answer can be given, nor yet a general principle laid down, the following figures for several cities in the United States are given:

| | Cost of Library. | Yearly cost of maintenance. | Circulation. | Volumes. |
|---|---|---|---|---|
| Boston | $2,368,000 | $329,000 | 1,504,086 | 678,949 |
| New York | 3,500,000 | 306,306 | 2,801,331 | 924,356 |
| Chicago | 2,035,550 | 273,339 | 1,165,588 | 285,317 |
| Buffalo | 1,000,000 | 87,805 | 1,094,424 | 205,000 |
| Cincinnati | 200,000 | 118,000 | 745,658 | 221,448 |
| Newark, N. J. | 400,000 | 60,000 | 500,000 | 100,000 |
| Dunkirk, N. Y. (About 20,000 population) | 30,000 | 3,000 | 38,000 | 8,000 |
| Colchester, Conn. | 10,000 | 550 | 10,500 | 4,300 |
| Brocton, N. Y. (Villages less than 10,000) | 10,000 | 600 | 8,000 | 2,000 |



NEW YORK CITY PUBLIC LIBRARY—CARRERE AND HASTINGS, ARCHITECTS

What should a city receive for the money spent in maintaining its library?

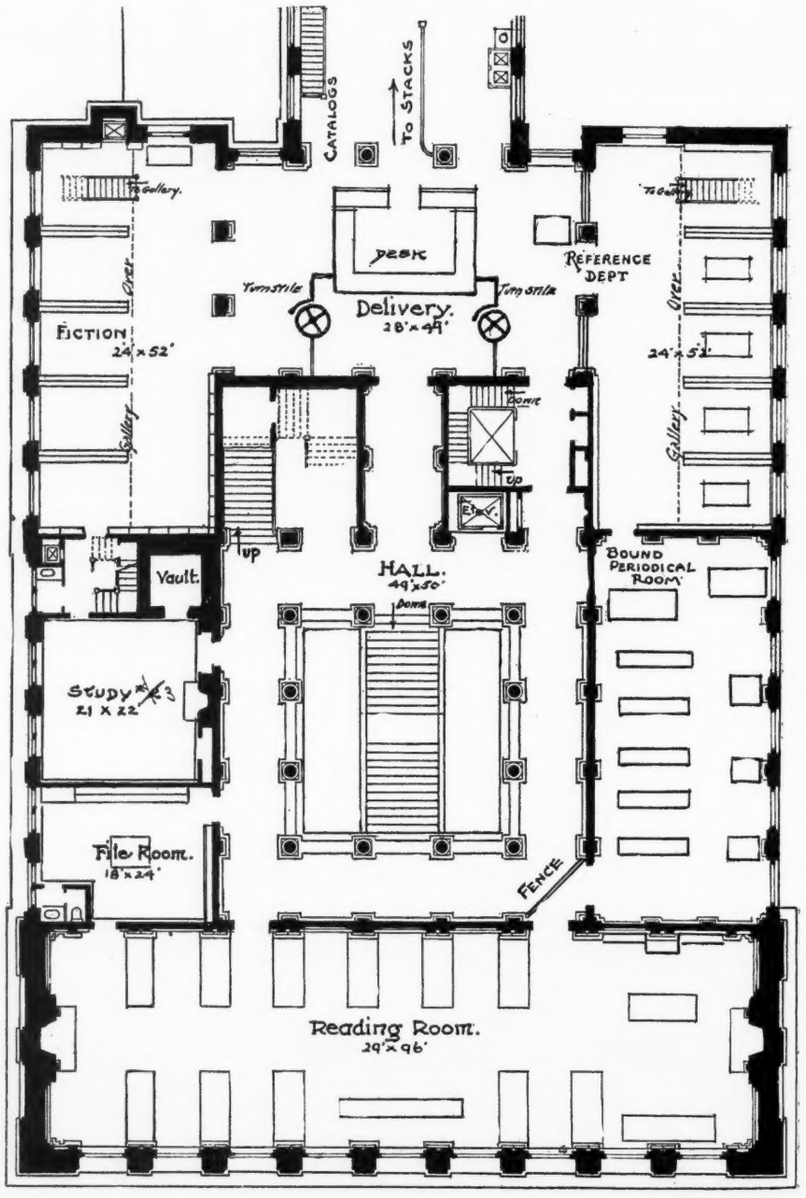
This is what Newark, N. J., does. It works along the lines of the duty of a library to a municipality, as outlined by its Librarian, Mr. John Cotton Dana. "A proper and worthy aim of the public library is the supplying of books on every art, profession or handicraft that workers in every department of life, who care to study, may perfect themselves in their work." The public library, then, is a means of elevating and refining the taste for giving greater efficiency to every worker. Newark provides headquarters for four of the school supervisors. During the year 1904 sixty organizations held meetings in the library. These meetings were attended by over 14,000 persons. Special collections of books were sent out to 41 schools. There were 261 of these collections, totaling 11,367 books, which were circulated 67,000 times. Collections of libraries were also sent out to the halls of the firemen, to the police stations hospitals, women's club, Board of Trade and other organizations. And who is so bold as to estimate the possible good arising from such a distribution of knowledge? This city, like so many others in our country, has a population largely made up of manufacturers and laborers, who are encouraged in every way to go to this source of knowledge and get information in regard to their special work.

Library methods have improved greatly of recent years, and the public is learning that it can find in public libraries specialized information applicable to all sorts and conditions of every day life.

The great discoveries of science, especially those of chemistry which enter so largely into manufacturing, are all to be learned for the asking, and many are the improved conditions, both as to manufacturers and artisans, traceable to information received at a public library. Nor is Newark selfish as to the benefits derived from the library. Surrounding municipalities have received of her bounty through a system of loaning reference books to her less fortunate neighbors.

How much should library service cost in any given city? Mr. Andrew Carnegie, who has considered the question as applied to a wider field than any one else and who has given to libraries over $40,000,000, lays down this general rule, and makes it a condition under which all his gifts are made: The municipality shall provide as a minimum, 10 per cent. of the value of the library for its annual maintenance. Many cities have found this too small to properly maintain their libraries—a fact which leaves room for public-spirited citizens to help along the good work.

*Boston.*—The library is 225 feet long, 227 feet deep, and its height from the sidewalk to the top of cornice is 70 feet. The material used is granite, quarried at Milford, Mass.—grayish-white to the first glance of the eye but, seen more attentively, especially in certain side lights, densely sprinkled with a delicate pink.




NEWARK PUBLIC LIBRARY —FIRST FLOOR PLAN.

The main façade, looking east over Copley Square, is in two stories, the lower heavily and plainly built, the rusticated masonry with its conspicuous joints suggesting rather a high basement than an ordinary lower story; and the upper arcaded for its whole length with thirteen magnificent window-arches. Above is a rich cornice; above that a purple-tiled roof—showing dark brown in

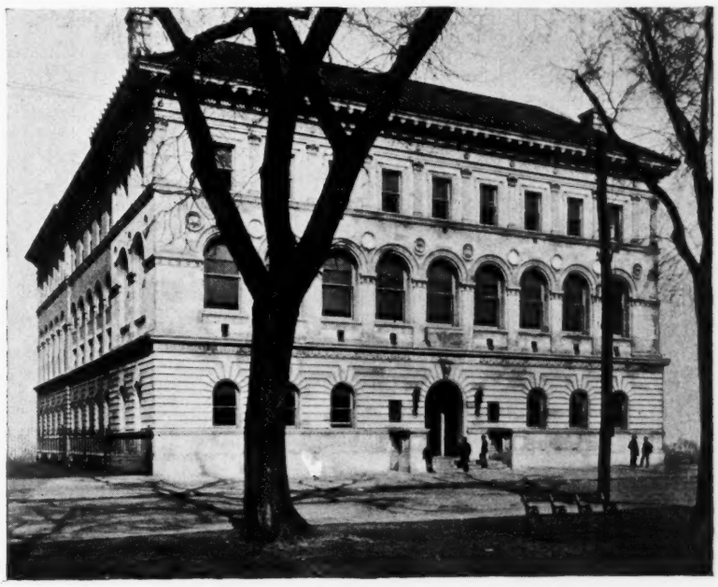
the full sunlight—and also giving a glimpse of a magnificent Interior Court. The entrance is by three arched doorways, and a low granite seat is raised upon a broad granite platform, necessary to give a dignified elevation above the flatness of the square, and the more salient features of the exterior have, perhaps, been indicated.

Boston's Library may well be said to be the keystone of her culture. Here Literature and Art meet. McKim, Mead and White, the architects, have designed one of the most beautiful buildings in America, and it is most fittingly adorned with the bronze statuary of Mr. St. Gaudens, the marble carving of Mr. Mora, and the medallions and seals of both these distinguished artists. The bronze doors of Daniel C. French, the Sargent paintings, the Abbey, Elliot and Chavannes decorations, all combine to make an interior worthy of the building they ornament.

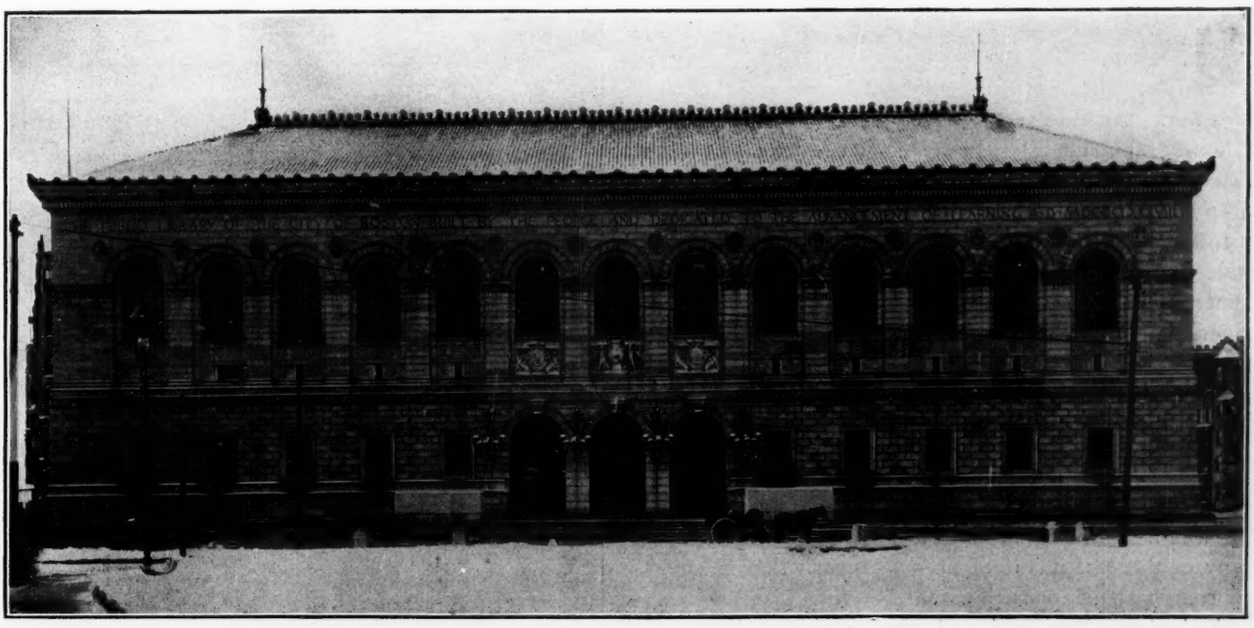
*New York.*— Of New York's magnificent library, under construction, the following brief notes may be given:

Its location is ideal, being about in the center of the city, on the west side of Fifth avenue, between Fortieth and Forty-second streets, the site formerly of the distributing reservoir built in 1837, which was removed to make way for the Library. It is to contain the libraries founded by John Jacob Astor, James Lenox and Samuel J. Tilden, which were free, but not circulating, nor open evenings or holidays. These were consolidated in 1895 as the New York Public Library. Other libraries were soon afterward added, notably those donated by Andrew Carnegie, most of which have separate buildings and will constitute branches of the main library.

It was in 1897 that the municipality of New York agreed to erect a building which would house these three largest libraries, definitely deciding that it would be open evenings, Sunday afternoons and holidays, and have a circulating department. It was desired that this building should be not only a storehouse for easily accessible information, and for profound study as well, but also be a municipal monument of architectural beauty. All architects of America were asked to submit plans in competition. From these were selected the plans of Carrere and Hastings. The accompanying reproduction of a photograph of the model shows how well the building answers the artistic requirements. The ground floor plan is also given.



NEWARK PUBLIC LIRBARY —RANKIN AND KELLOG, ARCHITECTS.



BOSTON PUBLIC LIBRARY —MCKIM, MEAD AND WHITE, ARCHITECTS.

The style is modern Renaissance, more or less of the Louis XVI. period, with such modifications as are suggested by the conditions and needs of our own age.

In general the building is rectangular, with two interior courts, four floors beside the cellar. The front and sides are comparatively low, the top floor being lighted by skylights, while the center and rear, in the form of a "T," contain the main reading and catalogue rooms, rising much higher, with windows. The main book-stack room occupies the larger part of the rear for the height of three lower floors, with the main reading room over it. The length of the first floor is, north and south, 390 feet; the depth, east and west, 270 feet; the main stack-room is 297 feet by 78 feet, seven floors, each 7½ feet, construction small steel beams and angles with floor slabs of marble 1½ inches thick.

The main reading room is 295 feet long, 76 feet wide and 50 feet high. The main stack-room has 63 miles of shelves, capable of holding 2,700,000 books. The foundation is largely of selected material from the reservoir. The walls above ground are of brick and cement mortar, faced entirely, including courts, with white marble from the quarries at Dorset Valley, Vt., not veneer, but one foot thick; 375,000 cubic feet of marble were used. Floors with steel beams and fireproof arch block; roof, copper and glass. The cost will be, approximately, $4,500,000, made up as follows:

| | |
|---|---|
| Removing reservoir and building foundation | $ 365,066 |
| Construction above ground (masonry) | 2,848,250 |
| Iron work | 916,703 |
| Heating and ventilation | 299,000 |

The following dates refer to its inception and construction:

Competition of architects, 1897.
Removal of reservoir begun, 1899.
Foundation begun, 1900.
Upper wall begun, 1901.
First marble set, 1902.
It is expected to be finished in 1909.

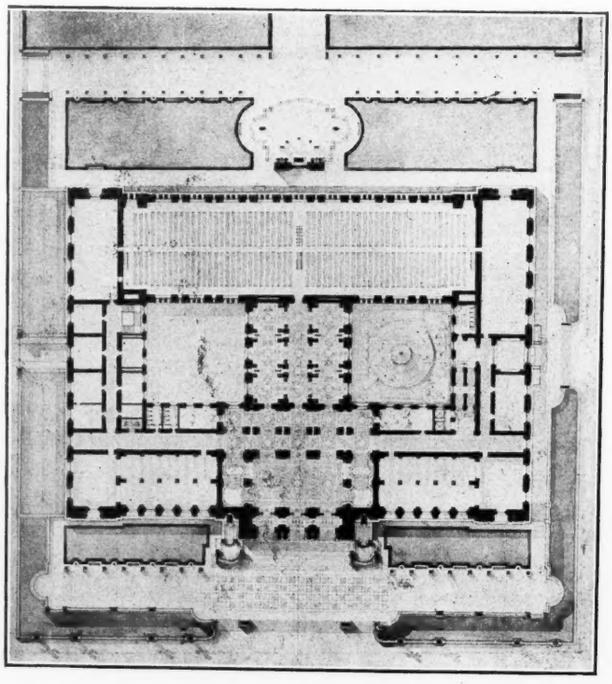
*Medford, Mass.*—An old homestead, given to this city for a library, is shown in one of the accompanying illustrations. Many cities have received gifts of fine old homesteads which are given for the purpose of forming a home for a library. So ingenious are the builders of library furnishings that stately homes are equipped with every modern convenience and serve the public most admirably. Famous homesteads, from which have been sent out the leaders of a community, are thus becoming storehouses of wisdom to which all may go and receive specialized information, applicable to all sorts and conditions of every day life.

*Dunkirk's Library.*—This building has been recently completed at a cost of $25,000, not including cost of site, and was designed by Architect Jeroloman to include as many of the best points of library construction as could be brought about for such a sum.

The building is of brick and litholite with steel girders, and is of fireproof construction. The radial stack with delivery desk, in the center of the building, with glass partitions between the reading and children's rooms, permits supervision by the Librarian in charge. A room is provided on the ground floor for the home of Literary and Musical societies, and an assembly room with a stage where concerts or readings can be given. The interior woodwork is of beautifully grained oak. The floors are covered with cork matting, reducing noise to a minimum. This building will have a capacity of about 30,000 volumes.

MEDFORD, MASS., LIBRARY —FORMERLY A RESIDENCE.

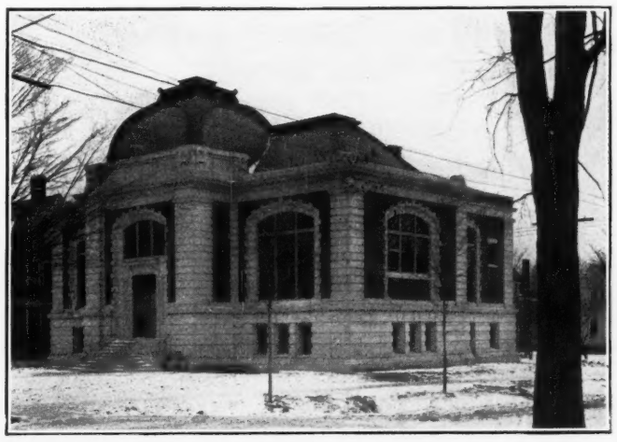
"Applied science" and "useful arts," which were but recently merely library terms, are fast coming to mean much to all who make use of the riches offered. Nature study is encouraged by good librarians, who get up bulletins of what out-of-doors offers. Interest in current events is similarly stimulated. It is from the future



NEW YORK CITY LIBRARY —FLOOR PLAN.

generation that the greatest returns are to be looked for from the good work of the library. This is especially true in the smaller communities, where many a child's interest and ambition are first aroused by right reading.

*Cragin Memorial Library, Colchester, Conn.* — The library building was given to the town of Colchester, Connecticut, by Dr. Edwin Bradford Cragin, Professor in the College of Physicians and Surgeons, New York City, in memory of his father and stands on the site of

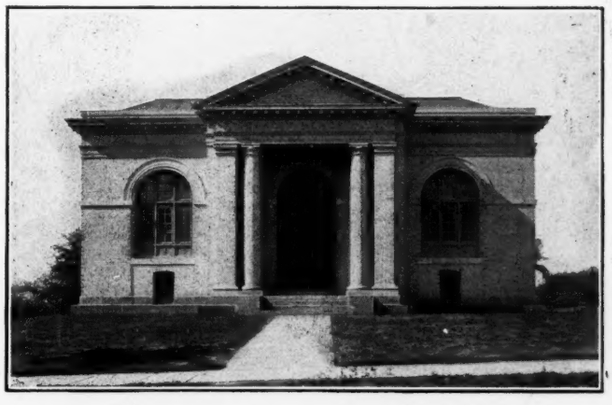


DUNKIRK, N. Y., PUBLIC LIBRARY.

Dr. Cragin's old home in the center of the village.

The walls are of a light colored pressed brick; the plinths, columns, and steps are of Indiana limestone; the remaining trim of terra cotta, and the roof is copper.

The library is upon the first or principal floor, and is approached through an open loggia, flanked by free standing limestone columns and up a short flight of steps. Facing the entrance is the delivery desk, back of which are the stacks. The present stacks are seven feet high with a capacity of 7,000 volumes, which can be doubled when desired by another tier of stacks above the present shelves. At either end of the stacks is a room, one for the librarian's use and the other for a reference room. The space at the front of the building on either side of the entrance is arranged for reading rooms, one being fitted up especially for the smaller children. These rooms have large open fireplaces of red pressed Roman brick with red Dutch tile hearths.



COLCHESTER, CONN.—CRAGIN MEMORIAL LIBRARY.

The interior finish throughout is oak stained and finished in a dark tint. The plastered walls are tinted to harmonize in a quiet gray green, the ceilings being white with a suggestion of the same color.

The shelving, tables, chairs and other furniture are of oak to match the finish.

In the basement is placed a gymnasium with recreation and locker rooms.

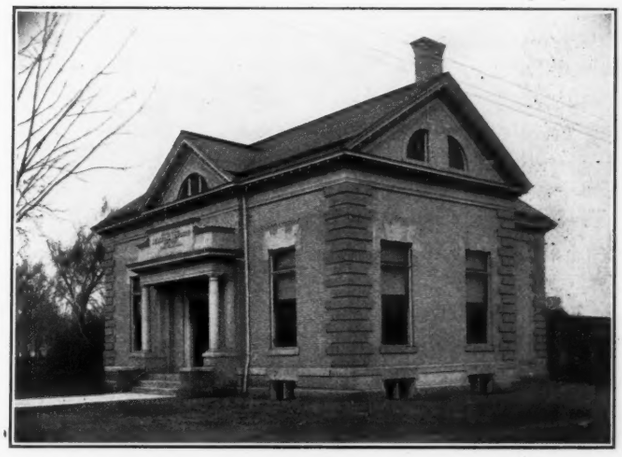
The building is heated by two hot air furnaces, one under the librarian's and the other under the reference room. One furnace is sufficient, except in the severe weather.

The architect is Albert R. Ross of New York, and the builders are Fissell and Wagner, also of New York. The Library Bureau supplied the shelving and furniture.

The cost of the building and fixtures was about $16,000.

There are nearly 4,500 volumes on the shelves, all of which have been acquired since 1890, when the building in which the old library was located was burned.

The attitude of the library towards the public in the matter of regulating the use of books has undergone a great change in recent years and is far from uniform in different libraries at the present time. A few decades ago a reader desiring to take a book from the library had to make a formal application for a card and perhaps give security guaranteeing safe return of the books.



BROCTON, N. Y. —AHIRA HALL MEMORIAL LIBRARY.

Even the use of books in the library was carefully restricted. Now a much more liberal attitude is taken towards the reading public. The object of the most progressive librarian to-day is to urge people to use books, to make them understand that books are the tools that intellectual men work with—there are a few occupations now, even those classed as manual, that do not illustrate the old adage that knowledge is power. In the most liberally managed libraries to-day anyone may have two or more cards at once on application. Anyone may go to any part of the library shelves, without special permission, and examine as many books as he pleases. If he needs assistance in his researches the service of expert attendants is available.

# THE DISPOSAL OF MUNICIPAL WASTE

## Systems and Methods, with Special Reference to American Conditions — The Term "Refuse" — New York City's Sanitary Code—Boston and Other Cities

By WM. F. MORSE, Sanitary Engineer, New York

The term "Refuse," often used to designate the collective mass of municipal wastage, is also applied to any one particular item or part of the same mass. The writer has preferred to follow the definition previously given, and to apply the word to the dry refuse and rubbish, as distinguished from other parts of city waste. Properly speaking, it should be used to designate only the very last stage, or the ultimate form of any kind of worthless matter, but this is a technical definition, and it is believed that it will be clearer and less confusing to employ it as defining that part of the genuine wastage known as dry refuse and rubbish, and not to use the word in connection with every form of waste as is generally done.

The separate treatment of refuse for the recovery of its salable parts has shown the need of a subdivision of the term "refuse." When the final disposition is by fire the refuse must be *combustible* in character, and after sorting out the valuable parts the remainder can be easily burned, leaving a small amount of ash that gives no trouble to dispose of. But the *non-combustible* part is more difficult to deal with, as it contains for recovery only metals and bottles that can be sold as junk, leaving the greater part absolutely worthless for any purpose. This is "rubbish," the last form of refuse, and the final residue of the whole collected mass of city waste.

This component (refuse) of city wastage represents many different things in different places. In the eastern part of the country it is called dry refuse or rubbish and includes all the inorganic rejected substance from the house, except ashes. It also frequently comprises out-of-door waste, such as cut grass, the sweepings of lawns and walks, leaves, the branches of trees, etc. In the west it is also termed refuse and rubbish, and is called collectively "garbage." In the south it is "trash," and while generally including nearly every kind of waste except garbage, frequently includes this also.

There is no clear distinction possible except in cities where a separate collection and separate service has been established; it then becomes necessary to define it accurately.

Regulations and ordinances have been adopted in practically all the municipalities of any size throughout the country, and these differ widely in various places. The question is receiving serious consideration of the authorities everywhere, and in time there will undoubtedly be more uniformity in the laws relating to the subject.

The Sanitary Code of New York City, probably the first to use definite terms, and which has guided most other places in this matter, defines the separation of wastes as follows:

Card of Instructions for Householders

| Put into Garbage Receptacles | Put into Ash Receptacles | Put into Rubbish †Bundles |
|---|---|---|
| Kitchen or Table waste, Vegetables, Meats, Fish, Bones, Fat, | Ashes, Sawdust, Floor and Street Sweepings, Broken glass, Broken crockery, *Oyster and clam shells Tin cans. | Bottles, Paper, pasteboard, etc. Rags, Mattresses Old clothes Old shoes, Leather and Leather scrap, Carpets, Tobacco stems, Straw and Excelsior (from households only.) |

*Note. Where there is a quantity of shells, as at a restaurant, they must be hauled to the dump by the owner.

†All rubbish such as described in this third column must be securely bundled and tied, or it will *not* be removed.

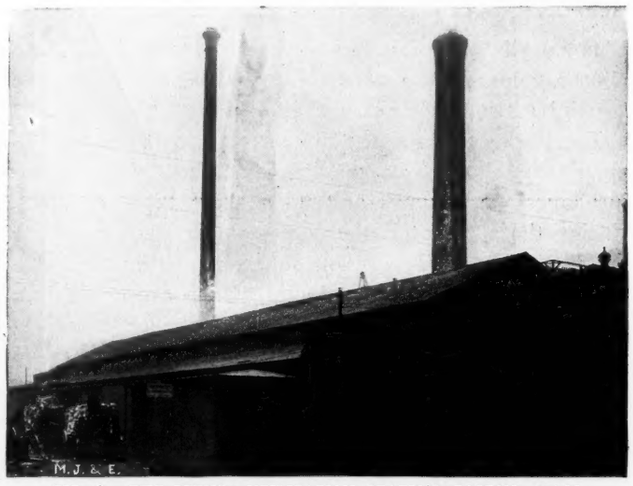



FIG. 3.—THE REFUSE UTILIZATION STATION, BOSTON, MASS.

FIG. 4.—THE RECEIVING ROOM AND CONVEYOR, BOSTON, MASS.

(Reverse of Card.)

"It is forbidden by city ordinance to throw any discarded scrap or article into the street, or paper, newspapers, etc., ashes, dirt, garbage, banana skins, orange peel, and the like. The Sanitary Code requires householders and occupants to provide separate receptacles for ashes and garbage, and forbids mixing these in the same receptacle. This law will be strictly enforced."

Boston follows the same code and regulations, but requires that bottles and cans that have held food shall be put with the garbage, and all other tins with the ashes. Other large cities follow the same regulations, with local changes.

The item of tin cans gives trouble everywhere; no one wants them, as, except in large numbers, their value is nothing. When in bulk the solder and tin can be recovered by heating, and the iron will bring in something for rough purposes. Tin cans properly belong with ashes, as any impurity is speedily deodorized by the fine ash.

There is a collection of refuse in some of the larger eastern towns, though little attention is paid to its disposal. About twenty New England towns have weekly or bi-weekly service, and some fifteen other places, west and south, collect refuse once a week.

### The Proportions of Refuse and Rubbish

So few reports of the actual percentages of refuse are available that it is difficult to give any data except that obtainable from estimate and observation. The subjoined table, compiled by the writer some years ago, is believed to be fairly representative:

Table VII. Approximate Percentage of Dry Refuse in Whole Municipal Waste

| | Per cent. by Weight | Per cent. by Volume | Wt. per cubic Yard | |
|---|---|---|---|---|
| New York.. ... | 7 to 10 | 20 to 25 | 140 lbs. | Ready for sorting |
| Brooklyn..... | 8 to 12 | 20 to 25 | 155 " | " " " |
| Boston..... | 4 to 6 | 15 to 20 | 202 " | Gross weight |
| Buffalo..... | 8 to 10 | 25 to 35 | 215 " | " " |
| Philadelphia.... | 6 to 8 | 15 to 20 | 175 " | Estimated |
| Berlin..... | 10 to 13 | ..... | ..... | ..... |
| London..... | 3 to 5 | ..... | ..... | ..... |

The lighter weights in New York or Brooklyn represent the amount collected by the city teams, but in reality the amounts produced are far greater. The best part of the dry refuse of New York City never comes to the city's carts. All large business houses sell their waste privately, or give it away on condition that their steam boiler ashes are removed free of cost. The janitors of apartment houses and the superintendents of office buildings control the waste paper for their own benefit. The city collects from private houses of the better class, and from the tenement districts and smaller shops, and all this is often picked over by junk dealers before the arrival of the city teams. Preliminary sorting for private sale is done in every large town to a greater or lesser extent; it is more noticeable in New York because of the relatively larger quantities.

The Boston collection is greater in weight and quantity, but of less value for market. The Buffalo refuse has a larger percentage of dust, dirt, iron and wood. That of Brooklyn is of the best average quality, as the paper and rubbish from the residential districts is cleaner and better than from the business sections. Chicago and some other places have a system of collection in stationary iron boxes at street corners, supposed to be for waste paper only, but which receive a large quantity of other matters. The franchise for the boxes is held by a company whose chief purpose is to use them for advertising purposes. The usefulness of this box service is very doubtful, considering the valuable room surrendered by the city at street intersections and the payment made of a small percentage upon the returns received from the company.

### The Volume of Dry Refuse

The amount of paper produced and consumed in this country is enormous in weight and bulk. Houses, shops, wholesale and department stores, office buildings, banks, factories and institutions, where the waste produced cannot be destroyed, send outside the building quantities of articles which have become worthless through use, or are not worth preservation owing to their cheapness and profusion.

Of this amount, paper in many forms is the largest proportion. It is stated on good authority that fifty pounds of paper were consumed by each individual in this country last year. The output of paper in the United States was over six billion pounds, manufactured in one thousand mills, and furnishing 7,500,000 tons of freight for transportation by rail and steamer.

To produce this paper whole countries and territories are laid under contribution, thousands of acres of forest trees are turned into pulp; the world is explored and ransacked for old or new forms of manufactured and vegetable products to be worked into paper stock, great factories and many firms and companies, with huge amounts of capital, are all busy trying to satisfy the insatiable de-

FIG. 5.—POWER AND HAND PRESSES, BOSTON, MASS.

mand of the public for more paper. An instance of the use of paper in New York City may be cited. The combined weight of one number of each of six Sunday newspapers, on March 5, 1906, was 5¾ pounds, an average of 15 1-3 ounces for each paper. The whole number of sheets, if spread out flat, would cover 52 square feet of surface. The length of these sheets, if placed end to end, the long way, would be 393 feet, about one city block. It is estimated that the newspapers of New York City daily consume 350 tons of paper, and that fully two-thirds of this remains in the city and is not sent out through the mails. This is upwards of 85,000 tons to be accounted for yearly, to which must be added the stream of other matter—circulars, posters, advertising and trade matter of all sorts, besides the great volume of paper in the weekly and monthly journals and magazines.

By far the largest proportion of paper manufactured, after serving temporary and transient purpose, is thrown aside as worthless. It is so cheap as to be hardly worth saving; its abundance makes it a nuisance, and it is the custom to get rid of it as soon as possible.

### First Municipal Refuse Utilization Station

The history of the efforts made in this country to systematize the collection and saving of this kind of municipal waste dates from the beginning of the experiments made by the late Col. George E. Waring, when Street Cleaning Commissioner in New York, ten years ago. He saw at Budapest a certain method of sorting the city waste by placing it in thin layers on an endless movable belt or platform, driven by power, and stationing on either side a file of women who, as it passed, picked out certain specific articles or substances which had a market value, or which could be put to some useful purpose. Not a cleanly, but a practical way of recovering things which would otherwise be wasted and lost. Col. Waring applied this idea at one of the New York Street Cleaning District Stations, and found that a large proportion of the rubbish could be saved, and that it repaid the effort and cost of recovery. He afterward built an experimental station to which was brought the refuse from three districts; erected a movable platform for sorting, and a furnace for burning the residue. The station built by the city, was run by contract, and the city received from it a revenue based upon a sliding scale, according to the quantities delivered, allowance being made for delay and stoppages. The collection of refuse was made by the city, and householders were asked to keep it separated from the garbage and ashes.

This experiment proved that there was a far greater value in city refuse than had been generally known; that the preliminary separation could readily be made at the house; that a separate force of men and carts could be profitably employed for collection; that the refuse could be sorted, baled and marketed, the worthless portions being destroyed without nuisance in the neighborhood of the works, and that there was revenue for the city in the process. Though the furnaces and machinery were not adequate for the work, yet the results were reasonably good, considering all the circumstances.

The returns from the Waring experimental station from January 1, 1898, to August 11, 1900—two years, seven months and eleven days—are shown by reports made by the Street Cleaning Bureau and by private observation. The amount of combustible refuse collected in three street cleaning districts, numbers 12, 14 and 16, respectively included in the territory bounded by Sixth and Seventh streets, South, the Bowery and Fifth avenue, West, Twenty-second street, North, containing 116,525 persons, and having a fair average of houses, shops, stores, department stores and factories is as follows:

Table VIII. Returns from East Sixteenth Street Refuse Disposal Station, New York City

| Year. | Loads. | Collections. | Payments to city by contractor. | Value to city per ton. |
|---|---|---|---|---|
| 1898 | 15,356 | 6,710 | $4,141 | 61.7 cents. |
| 1899 | 12,946 | 5,660 | 3,109 | 54.9 cents. |
| 1900 | 7,422 | 3,300 | 3,680 | $1.10 (7 mos.) |

Table IX. The Quantities and Component Parts of Refuse Received in 1899

| | | |
|---|---|---|
| Paper, books, strawboard, etc. | 3,058,616 | lbs. |
| Rags, carpets, clothing, shoes, etc. | 576,812 | " |
| Iron, copper, brass, lead, rubber | 132,438 | " |
| Bottles, proprietary | 29,000 | No. |
| Bottles, common | 350 | bbls. |

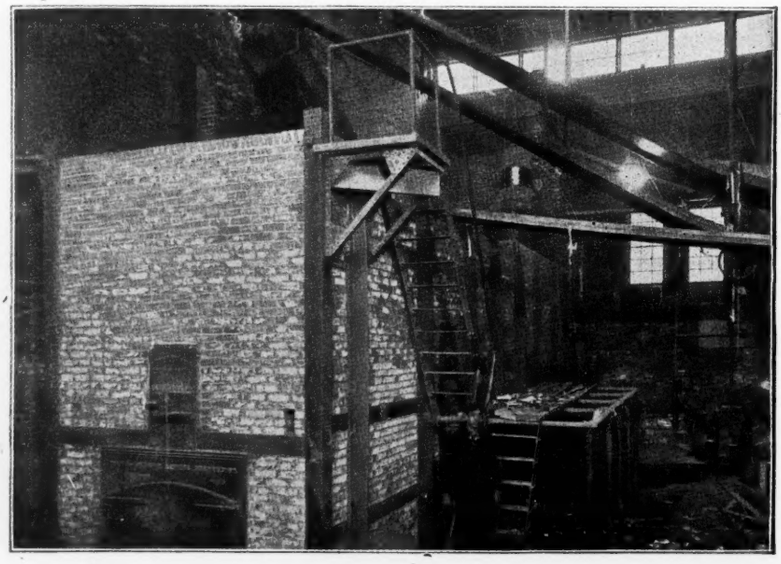


FIG. 6.—CONVEYOR, DESTRUCTOR, BOILER AND DYNAMO, BOSTON, MASS.

Nearly all this refuse came from houses and shops, the large department stores contributing about 1,500 loads of wrapping paper and strawboard. A smaller proportion of factory waste was received, most useless except for fuel. These items may be still further classified.

TABLE X. PERCENTAGE OF SALABLE PORTIONS IN ONE HUNDRED PARTS

| | |
|---|---|
| Paper, six different grades | 74.5 |
| Rags, clothing, bagging, twine | 12.2 |
| Carpets, four grades | 3.3 |
| Bottles, common and proprietary | 2.5 |
| Metals, iron, brass, lead and zinc | 2.1 |
| Tin, all sizes and kinds | 1.4 |
| Leather, shoes and scraps | 1.9 |
| Rubber, shoes, hose and mats | .2 |
| Barrels, whole | 1.4 |
| Other salable material | .5 |
| | 100.0 |

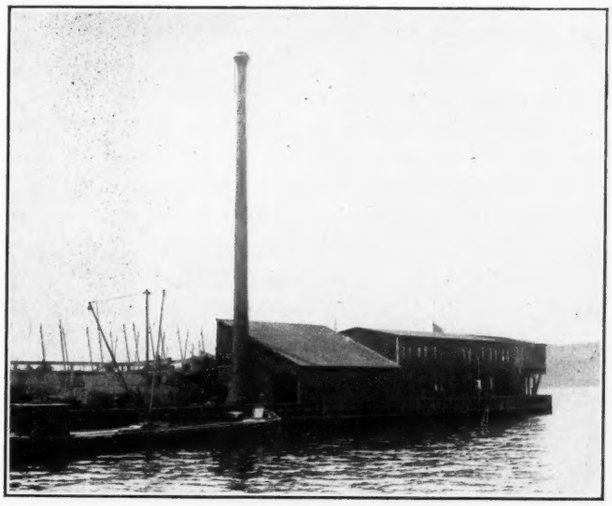


FIG. 7.—FORTY-SEVENTH STREET INCINERATING PLANT, NEW YORK CITY.

Of the whole annual quantity by weight thus treated, 37 per cent. was sorted and sold, 60 per cent. was burned, and 3 per cent. to 5 per cent. was incombustible, and was taken away with the ashes, which formed about 17 per cent. of the quantity burned. About 75 horsepower in steam was derived from combustion, of which less than 25 per cent. was utilized. This station was discontinued by a new city administration, and for two years all the city's refuse was gathered and marketed for the benefit of one contractor, who, after rough sorting at the dumps, conveyed the remainder of the refuse in scows to fill land.

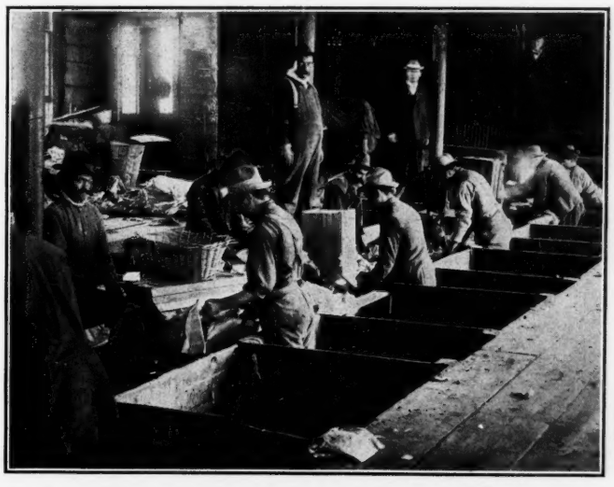


FIG. 8.—SORTING ARTICLES OF VALUE FROM CONVEYOR; FORTY-SEVENTH STREET, NEW YORK.

### THE REFUSE UTILIZATION STATION IN BOSTON

Up to 1898 the city of Boston collected the refuse and rubbish with the ashes, and towed the larger part to sea outside the harbor. Under the influence of tides and winds the lighter portions were carried to adjoining beaches, causing complaints and threats of litigation. The matter was taken up by the city Board of Health, under the leadership of Dr. Samuel H. Durgin, President, resulting in action by the Mayor and the City Council, who asked for plans and estimates for a disposal station for dry refuse.

The designs, estimates and superintendence of the writer were accepted by Mayor Josiah Quincy, and a contract was made, in 1898, with a company organized for the purpose, for a term of ten years, with the privilege of purchase by the city at the end of five years, or an extension to the company for the same length of time.

The city furnishes the ground, collects and delivers all the refuse, and pays the company $5,500 annually. The plant, which cost $30,000, was erected and is maintained and operated by the company, which receives all revenue from the material sorted, and disposes of the residue.

The station is located at the Fort Hill dumping wharf, on Atlantic avenue, about one-half mile from City Hall, nearly in the geographical center of the city, and on the line of the elevated and surface car lines. It consists of a building 162 feet long, 80 feet wide, with brick walls and steel columns supporting a wooden roof. There is a sub-basement under one-half of the building containing the baling presses and destructor. A large storage space is provided for receiving the waste, the carts discharging with no delay, except for weighing each load. From this receiving room the refuse, with a little preliminary sorting to remove heavier articles, is placed on an endless belt or movable iron platform four feet wide and 150 feet long, which carries it slowly toward the other end of the building. On each side of this moving conveyor stand files of men who pick out the several grades of paper, rags, cardboard, etc., and place in bins behind them.

The bottoms of these bins discharge into power-driven presses placed in the basement, which press the paper and rags into bales of 600 pounds. The other articles, glass, iron, leather, twine, etc., are removed to separate bins. The portions of refuse, not worth saving, remaining on the conveyor are discharged in a continuous stream into the destructor placed across the rear end of the building, everything worthless being burned without delay, and without rehandling or sorting.

This destructor is of a special and peculiar type, built with interior walls of heavy fire-clay blocks, and exterior walls of red brick, solidly braced with buckstays and

tie-rods; it is provided with fire-clay covers for the feeding holes, and doors for removing ashes and clinker.

At the rear end, between the furnace and the chimney, is a 60-horsepower steam boiler with an independent fire-box, operated solely by heat from the destructor, and furnishing the power for moving all the machinery for sorting, baling, driving a dynamo for lighting the building (ten arc and thirty incandescent lamps), and for heating it in winter. No fuel has ever been used except the refuse, and but a portion of the heat developed is used.

A boiler of 150-horsepower can be maintained at its full capacity by the heat from the destructor. The draft is regulated by heavy fire-clay dampers, the surplus heat going through a by-pass to the chimney—a self-supporting steel shaft 140 feet high, lined with fire brick. The plant operates from eight to twelve hours a day, dependent upon the supply of refuse, and has a capacity of 500 cubic yards in twenty-four hours.

Table XI. Amounts of Refuse Received at Boston Station

| Years. | Loads. | Weight per Load. (lbs.) | Tons. |
|---|---|---|---|
| 1899 | 16,926 | 796 | 6,736 |
| 1900 | 16,423 | 1,045 | 8,581 |
| 1901 | 17,585 | 1,045 | 9,188 |
| 1902 | 16,684 | 1,045 | 8,717 |
| 1903 | 15,875 | 1,045 | 8,294 |
| 1904 | 16,234 | 1,045 | 8,482 |
| 1905 | 17,109 | | 8,939 |
| | 116,836 | | 58,937 |
| Yearly average, | 16,690 | | 8,419 |
| Daily average, | 55 2-3 | | 28 |

The refuse is collected from city districts which include the business and a part of the manufacturing section, besides a large area of the residential part, the estimated population being 200,000, and covering ninety-five to one hundred miles of streets. The collection is made daily by seventeen large market wagons, and by thirty-one paper carts, the daily average being from fifty to sixty-five loads; a maximum of one hundred loads has been dealt with.

The character and composition of this refuse is very nearly the same as in New York, but the separation of the various grades of paper and saving of minor articles is much more thoroughly done. The quantities sorted cannot be accurately stated, but in a general way it can be said that 50 per cent. by weight and 65 per cent. by volume is sorted available for market. The amount burned is about 25 per cent. by volume; 10 to 12 per cent. is worthless and is removed, with the 15 per cent. of ashes remaining from combustion, to the adjoining dumping scows and towed to sea.

The destructor was the first of its type erected, being a radical departure from the experimental furnace of Waring, and unlike, in many points, the existing types of American cremators. It is a down-draft furnace, taking all the material through a chute kept continuously supplied by the conveyor belt, the air for combustion entering through the same opening on the top of the furnace. This kind of bulky waste requires larger furnace capacity and more air than the usual garbage and rubbish, and the grates and flues must be arranged to allow the free and uninterrupted passage of a larger volume of gases, to avoid back fire when the furnace is full. There must also be ample provision for detaining small floating particles of ash or partly burned bits of paper, a point usually overlooked in American practice.

The boiler was intended only for the work of this plant, as no use could be made of the surplus heat, and the power now employed is less than 50 per cent. of the capacity that can be developed. If an opportunity offered, a boiler of 150-horsepower could be operated by the gases of combustion, and the earning capacity of the plant in steam power be increased nearly three times.

The automatic charging by the conveyor belt requires only two men to operate this furnace, an important saving as compared with incinerators where four to six men are constantly needed to fire by hand, stoke, and remove ashes. There was at first a secondary fire box provided for consuming gases by extra fuel, but as this was not needed, in repairing the furnace after six years of continuous use it was deleted. But few changes or alterations have been found necessary, these comprising power presses instead of hand, an ash lift for removing ashes and rubbish, and a hoist for loading the bales of paper. While there is no direct revenue from this plant to the city, it receives the greater benefit from this system of disposal, as the delivery of the refuse at this central station is less expensive than before, the cost of transportation outside the harbor is saved, and the sanitary disposal is a vast advantage over the former methods, with their attendant nuisances and constant complaints.

### The Forty-seventh Street Refuse Utilization Station, New York City

At the incoming of the reform city government of New York, in 1902, the Commissioner of Street Clean-

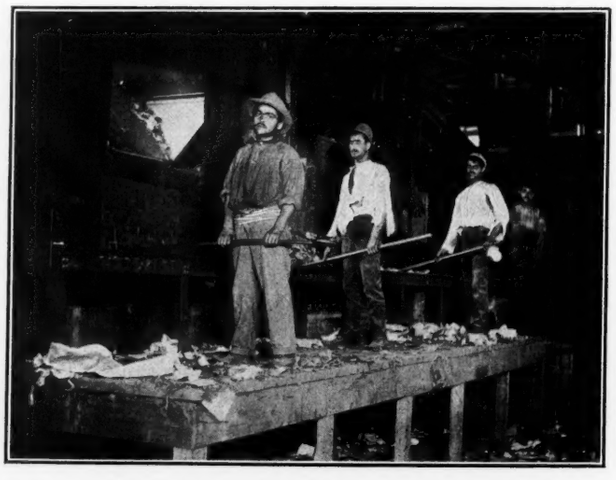


FIG. 9.—FEEDING AND STOKING THE INCINERATOR FURNACE; FORTY-SEVENTH STREET, NEW YORK CITY.

ing, Major J. McG. Woodbury, caused to be erected on a pier extending into the Hudson River at Forty-seventh street a rubbish incinerator described by the designer, Mr. H. De B. Parsons, C.E., as follows:

"The design of the incinerator . . . consists of three cells, each having thirty square feet of grate area. The products of combustion pass over the cells into the smoke flue in such a manner that the product from cell No. 1 has to pass over cells Nos. 2 and 3; the product of combustion from cell No. 2 mixes with the products from cell No. 1, and together they pass over cell No. 3; and that from cell No. 3 mixes with the products from cells Nos. 1 and 2, and is intimately mixed again in passing along a tortuous flue to the base of the stack. The result of this arrangement has been highly satisfactory, as regards the non-production of smoke. Taking a stormy day, when the material was brought to the incinerator wet, the smoke was seldom visible for more than about seventy-five feet from the top of the stack, and then only during the period of stoking one of the grates.

FIG. 10.—LIGHT REFUSE CART, USED IN NEW YORK AND BOSTON.

"This incinerating plant was constructed as an experiment. In order that it might be free from any hindrance from injunction or otherwise, lest it might create a nuisance to neighboring property, it was decided to locate the plant on one of the city piers, about 250 feet from the bulkhead line. The permanency of location, of course, was not considered, the idea being that if the plant could be constructed quickly, and show that combustion could be carried on without creating a nuisance, it would lead to the introduction in the future of other stations, more favorably situated, and at which better facilities could be provided for the reception of the material and for picking the same."

Shortly after the incinerator was built some changes were found necessary. The flues connecting with the chimney were simplified to allow a shorter passage of the gases. A larger boiler was installed with more direct connection with the furnace; a picking belt, or conveyor, with bins for sorting the refuse, and an engine and dynamo for electric lighting were added. From an incomplete report of one day's operation, made by Mr. F. L. Stearns, C.E., engineer-in-charge, the following data are condensed:

REPORT OF FORTY-SEVENTH STREET INCINERATOR, NEW YORK, OCTOBER 7, 1904

The measurements for weights, bulk, and fuel value of waste were made on the loads received for one-half day. The tests for power were made on the entire day.

TABLE XII. QUANTITIES RECEIVED

| | No. of Loads | Cubic Yards | Cubic Yds. per Load | Weight, Pounds | Weight per cubic Yard |
|---|---|---|---|---|---|
| City carts..... | 44 | 33¾ | 7.6 | 48,100 | 140 lbs. |
| Private carts... | 10 | 39 | 3.9 | 4,530 | |

TABLE XIII. SORTED MATERIAL

| | Cubic Yards | Wt. lbs. | | Cubic Yards | Wt. lbs. | | Cubic Yards | Wt. lbs. |
|---|---|---|---|---|---|---|---|---|
| Newspapers.. | 98 | 5184 | Rags..... | 6⅛ | 1007 | Iron & tin | 16 | 1942 |
| Manila paper. | 54½ | 1250 | Bagging.. | 1 | 184 | Bottles... | ½ | 363 |
| Pasteboard . | 105 | 4909 | Carpets... | 1½ | 274 | Barrels... | 21 | 2826 |
| Mixed paper . | 53 | 2613 | Shoes.... | ⅛ | 180 | Boxes.... | 11 | 1400 |
| Mixed paper and rags. | 6 | 625 | Hats..... | ⅛ | 17 | ..... | ... | .... |
| Books..... | ½ | 259 | Rope..... | ⅛ | 111 | ..... | ... | .... |
| | 317 | 14840 | | 10½ | 1779 | | 48½ | 6531 |

Total picked out, 23,114 lbs.; 48.8 per cent. by weight, 63.5 per cent. by volume.

Total burned, 24,275 lbs., 51.2 per cent. by weight, 36.5 per cent. by volume.

Total ashes from combustion, 3,529 lbs. = 6.8 cubic yards, at 519 lbs. per yard.

Percentage of ashes of amount burned, 10.7 by weight, 3.1 by volume.

FINANCIAL STATEMENT

| INCOME. | | EXPENSES. | |
|---|---|---|---|
| By saving on former method of disposal, per week ..... .. | $210.00 | To cost of labor.. | $ 77.19 |
| By electric light utilized, per week | 4.00 | Supplies, etc., and interest on plant | 38.46 |
| | $214.00 | | 115.65 |

| | |
|---|---|
| Net income per week..... | $ 98.35 |
| Total return per annum..... | 5,114.20 |
| Value of steam power not utilized .. | 8,000.00 |

This report gives no value of the sorted rubbish, which is placed by the Commissioner at $3.20 per ton paid by the contractor for the privilege of sorting.

Accepting this as the average daily work performed at this station, and comparing it with the experimental plant of 1898-1900, a very considerable advance is shown in the quantities received, the proportion saved for mar-

ket, and the amount burned, together with a far larger proportionate steam power developed; also a smaller proportion of ashes, showing better combustion; and a gain in revenue to the city of $2.10 per ton on refuse marketed.

### The Value of Refuse

The method of recovery and the value of marketable refuse in the whole of New York City is thus stated*: "The rubbish is picked over at the dumps [and utilization stations] by a trimming contractor, who pays the city for the privilege. The value of this marketable refuse to the city is about $3.20 per ton. The Commissioner of Street Cleaning has stated that this figure is too low; probably it should be increased 50 per cent. It is figured thus: The average rubbish collections are 300 tons per day, or 1,800 tons a week, of which the marketable proportion is 35 per cent., say 600 tons. For this the contractor pays the city approximately $1,920 weekly, or at the rate of $3.20 per ton." In this case the "City" comprises the boroughs of Manhattan and Bronx only, as Brooklyn, Queens and Richmond deal with their own refuse. The total yearly amount of marketable material is 93,600 tons, and the payment made for the privilege of sorting everything saleable in $110,000. The calorific value if New York refuse for the development of steam power will be considered later.

*(To be continued)*

## METHOD OF STREET CLEANING

### Good Work in Baltimore by Col. J. L. Wickes—Large Force Employed—Burnt District

The phenomenally good work done by Street Commissioner Col. J. L. Wickes in handling the immense amount of material resulting from the Baltimore fire, two years ago, is being repeated, on less sensational lines, now that the reconstruction of the burnt district adds so large a volume to the normal annual amount calling for removal. Including ashes, refuse, street dirt, sand, snow, ice, garbage, etc., no less than 1,205,725 cubic yards of matter were removed from the city last year—this corresponding to a continuous wall, three feet wide and three feet high, extending for 685 miles.

The garbage, ashes and miscellaneous refuse are collected and disposed of by the Baltimore Sanitary Contracting Company, under a contract costing the city, in 1905, $198,800, equivalent to 68 cents per load, as compared with 82 cents in 1904. The cost of snow removal was 21.8 cents per load in 1904 and 20.8 cents in 1905.

Ten horse street sweepers are kept busy for an average of ten hours seven nights a week. A force of 117 sweepers and scrapers, with 113 teams, is the principal item in the annual expenditure of nearly $500,000 in this department.

*H. De B. Parsons, C. E.—Transactions Am. Soc. C. E., Vol. L, 1903.

## STREET PAVEMENTS OF BALTIMORE

### City Engineer Fendall Would Institute Needed Reforms—A Bond Issue of $5,000,000

The city of Baltimore would be hard put to it to deny its distinction of being the worst paved city in the country. Out of 430 miles of streets, 263 have no better surface than cobble stone, surely the worst form of pavement known to modern civilization. Of the remainder there are 43 miles of Belgian block not in the best condition, 9 miles of sheet asphalt and 13 miles of block asphalt, the last named being truly an infliction upon the city. Much of it is full of holes and so "billowy" as to produce a sensation only too reminiscent of seasickness in riding over it at speed.

Whoever may be to blame for this state of affairs, City Engineer B. T. Fendall is certainly not responsible. He is engaged at the present time in a strong and well-supported effort to take the existing control in this respect out of the hands of the Councils, and to have it left to the City Engineer to determine the character and location of the pavements. Some very plain talk is being indulged in as to the influences exerted during the last two months to hold up a proposed special ordinance which would confer this power upon the City Engineer. Having regard to the notoriously poor quality of the block asphalt paving, it is felt by many influential citizens and officials that an extension of this class of pavement, at any rate on existing lines, would be prejudicial to the best interests of the city, and efforts are accordingly being made to eliminate, or at least to curtail, expenditures on such work out of the $214,000 paving ordinance now before the Councils.

City Engineer Fendall's own preferences lean toward sheet asphalt, wood block, brick and bitulithic, according to location, with a maximum of sheet asphalt. He makes the reservation, however, that Trinidad Lake asphalt should be excluded, and favors the use of natural asphalt containing not less than 90 per cent. bitumen. Warrant for this preference for sheet asphalt is found in the present condition of streets paved with this material many years ago. With only five miles of brick streets to date, a considerable extension of that pavement is foreshadowed, Mr. Fendall favoring its use in certain localities. There are 45 miles of unpaved and unimproved streets and 50 miles of macadam.

An enabling act now before the State Legislature provides for the issue of $5,000,000 bonds, to be applied to street improvement. It is believed that it will become a law, but will have to be passed upon by the Councils, signed by the Mayor and approved by the people at the next regular election. Public sentiment is strongly in favor of this measure, and its passage would do much to bring about a greatly needed change in the street pavements of a city which has shown itself abundantly capable in other fields of civic work.

# PRACTICAL WATER SOFTENING FOR MUNICIPALITIES

**Methods to Improve Supply for Drinking and Industrial Uses—The Character of Natural Waters—Rain, River and Lake Sources—Facts and Figures**

By C. HERSCHEL KOYL.*

FEW people know that the average family of the hard water States wastes enough soap on "washing day" to pay for the softening and purification of all the water it uses for the week; and that in vain is the hope of economy for which it submits to incrusted teeth, chapped hands, spotted linen and all the discomforts of hard water.

The water supply of a city should be fit not alone for drinking, but for the bath and laundry, for steam boilers and general industrial use. Water for drinking should be free from pathogenic germs and from mud and other suspended matter; for the bath, the laundry, and most industrial uses, it should be soft; and for boilers it should be soft and also free from carbonic acid gas ($CO_2$) and oxygen.

Water softening is, specifically, the art of extracting from water the calcium (lime) and magnesium compounds which combine with soap and prevent the formation of lather, and thus are said to make the water hard; but, in general, the art covers the extraction from water of any substance, lime, magnesia, acid, carbonic acid gas, mud or other material which renders the water unsuitable for industrial use. Incidentally, the process constitutes also a most efficient germ extractor for drinking water, and is so cheap in installation and operation that no municipality can afford to waste the money and disregard the comfort and health of its citizens by supplying them with hard, muddy or germ-infected water.

## CHARACTERS OF NATURAL WATERS

Rain water mixes readily with soap to form a slippery lather, and thus is said to be soft. It contains only the soluble gases of the atmosphere—carbonic acid gas and oxygen—and such dust as it may have washed out of the air in its fall; on the supposition always that it is caught in clean vessels and not from city roofs laden with dust and soot, nor from country roofs and eaves covered with the excreta of birds and swamp-mud and fish-worms which the birds have brought. If it runs down a clean grassy slope, or over granite rocks, to a stream, it is still nearly pure soft water. If it runs a short distance over limestone, or ground containing particles of limestone, it will dissolve a small amount, perhaps two grains per gallon, or one part of limestone to 30,000 parts of water, but for practical purposes this is still called soft water.

If, however, rain water sinks into the ground to remain a long time in contact with limestone, it dissolves greater amounts, frequently 20 grains and sometimes more than 100 grains per gallon of water; it is commonly said to be hard if it contains more than five grains per gallon. Deep well waters are nearly always of this nature, and contain from 20 to 100 grains per gallon of carbonate of calcium, carbonate of magnesium, sulphate of calcium and similar compounds, according to the character of the rock which has been exposed to the water. In the arid plains of the western part of the United States, where the soil contains large quantities of common salt (chloride of sodium) and other salts of sodium and potassium which are readily soluble in water, the well waters are heavily charged not only with the salts of calcium and magnesium, but also with the salts of sodium and potassium, and are called alkali water. The water found near coal fields frequently contains free sulphuric acid to the amount of two or three grains per gallon.

Lakes receive the waters of many creeks and rivers, and are usually soft; but the current is slow and there is some concentration due to evaporation of the water, so that lake water contains rather more mineral matter than river water and is on the border line between soft and hard. Lake Erie water contains about five grains per gallon of the salts of calcium and magnesia.

Oceans are the final receptacles for the waters of rivers and lakes and are subject to continuous evaporation, so that in the course of years the mineral matter has become concentrated; ocean water contains about 2,100 grains per gallon of mineral water, made up of calcium carbonate, 8 grains; calcium sulphate, 75 grains, magnesium sulphate, 99 grains; magnesium chloride, 230 grains; potassium sulphate, 55 grains; sodium chloride, 1,633 grains. Great Salt Lake in Utah and the Dead Sea in Palestine are small inland oceans without other known outlets than evaporation, and since the rivers feeding them are heavily charged with common salt, these lakes contain much more of it than the oceans. Ocean water has about 3.5 per cent. mineral matter, Great Salt Lake about 20 per cent., and the Dead Sea 26 per cent.

## WATER FOR THE HOUSEHOLD

The suitability of a water for household purposes other than drinking should be considered in determining the character of the general town supply. It follows, therefore, that the town supply should be soft, and it is evident from what has been said above that the sources of such water are limited to creeks, rivers and lakes; for most well waters and all ocean waters are too hard. And these river and lake waters should be not only soft—that is, free from dissolved limestone—but also clean, that is, free from mud and other matter in suspension.

*Consulting Engineer, New York City.

When hard water is used in the household, the result is both annoying and expensive, for it inevitably causes chapped hands and much personal discomfort the limestone dissolved in the water eats up soap at a tremendous rate and must all be neutralized before a lather can be produced. If we imagine a town supply to be ordinary hard water containing, say, ten grains per gallon of carbonate of lime, and imagine the average family of five people to use 3,000 gallons per week, then the cost to the family of softening that much water might possibly be seven cents per week; the family washing for the week will require about one hundred gallons, and that much water, containing ten grains per gallon of dissolved limestone, will eat up seven cents worth of soap before an efficient lather can be produced for washing purposes. In addition to this expense, there is the further objection to the use of hard water in washing clothes that the union of soap and limestone forms a kind of curd which fastens itself upon the fibres of the cloth and is almost impossible to wash out, always leaving colored spots and permanent stains.

### Water for Town Industries

In the dyeing operations of silk mills, where uniformity of color and shade are essential, the losses due to these spots are sometimes ruinous to the business, a fact which explains why silk and other textile factories are found gathered in small sections of the country where pure, soft water is available. For, just as it is cheaper to manufacture iron in the vicinity of coal fields where fuel is abundant, so it is cheaper to wash and dye silk, cotton and wool where the water is soft and clean.

In the other manufacturing operations of a town, where large quantities of water are used for the production of steam in boilers, the evils of hard water are no less apparent. When hard water is evaporated in a boiler, the mineral matter is left in a solid mass of scale, coating the inside of the boiler. This scale frequently becomes a quarter to half an inch thick and prevents the easy transfer of the heat of the fire through the iron of the boiler to the water. It is well known that if the iron shell of a new boiler is more than 5/8-inch thick the iron will take up heat from the fire faster than it can be transmitted through its thickness to the water, and the iron will be gradually burned off on the fire side until it is down to a thickness not greater than 5/8-inch, after which it will go on doing its work for years without further impairment. But the stony scale deposited from hard water conducts heat much less readily than iron. If, then, we take a new boiler with an iron shell 5/8-inch thick and allow it to be coated on the inside with this hard water scale, the iron immediately begins to burn away on the fire side, and in the course of a year or so the boiler must have a new fire-box, at an expense of $400 or $500; whereas, if we supply to the boiler only clean, soft water, it can be used continuously for more than twenty years without noticeable depreciation. Furthermore, while the boiler is coated with scale it is so much more difficult to get the heat through to the water that more fuel must be used than if the boiler were clean and nothing separated the water from the iron which heats it. The amount of extra fuel required to evaporate water in a boiler which is coated with scale varies with the thickness and character of the scale, and with the rate at which the boiler is worked. When the boiler is being driven to nearly its full capacity, the amount of extra fuel required by a 1/4-inch layer of scale is frequently as much as 50 per cent.; while if the boiler is being worked at only half its capacity the difference may not be more than 10 per cent. In any case, *using* hard water in boilers is much more expensive than *softening* it, because on the average 1,000 gallons of hard water will cost 50 cents in extra fuel and repairs to the boiler, while 1,000 gallons of hard water may almost always be softened for less than four cents.

### Sources of Water Hardness

It will be understood that water is not affected by igneous rocks, like granite, but that it is rendered hard by flowing over limestone rocks of different kinds, which abound near the surface of the earth, and which are usually not pure limestone but composed partly of magnesia, and are then known as magnesian limestone. Gypsum is a sulphate of lime. Marble is generally pure carbonate of lime. Gypsum is easily soluble in ordinary water, and there are many underground streams in the United States (for instance, about a hundred feet beneath the city of Newark, N. J.) which contain more than 100 grains per gallon of dissolved gypsum. Pure water might, however, flow for a hundred years over a bed of marble without dissolving enough of the stone to produce any ill effects in the water; for it is only when water contains carbonic acid gas ($CO_2$) in solution that it can dissolve carbonate of lime.

### Water Softening

This brings us at once to the secret of the method of extracting carbonate of lime or magnesia from water. Since carbonate of lime or magnesia can be held in solution in water only in the presence of carbonic acid gas, we simply steal away from this kind of hard water the $CO_2$ by introducing plain fresh lime (oxide, CaO) which it likes better than carbonate of lime; the $CO_2$ at once drops the carbonate of lime and attaches itself to the oxide of lime. The immediate result is that the carbonate of lime, which is now nothing but fine marble dust, begins to settle to the bottom of the tank, and the carbonic acid gas combines with the fresh lime to form other particles of carbonate of lime ($CO_2 + CaO = CaCO_3$) which also are nothing but fine insoluble marble dust, and begin at once to settle. This is the whole theory for the softening of water which has become hard from taking up carbonate of lime. The process was discovered or invented in 1840 by Dr. Clark in Scotland, and has been used ever since with the best results. In practice it is necessary to slake the fresh lime and to proportion it exactly to the amount of carbonate of lime and free carbonic acid in the water. Care must be taken that not too much fresh lime be used, for then the water would become hard again, because pure water can dissolve large amounts of oxide of lime, though it cannot dissolve

carbonate of lime except in the presence of $CO_2$. But these are all details of the practical art which will be discussed in the second article.

The other compounds of calcium and magnesium, the sulphates and chlorides, become dissolved in water without the aid of carbonic acid gas; consequently, our simple method for stealing away $CO_2$ will not help us in extracting from water these other compounds. In their case we can soften the water (cheaply) only by substituting, for the salts of lime and magnesia, other salts which will not affect the water. It so happens that the sulphate and chloride of sodium do not make water hard and, in ordinary amounts, are perfectly harmless whether the water be used for drinking, for washing or for steam boilers. Therefore if the water contains, say, ten grains of calcium sulphate, we add to it a proportionate amount of sodium carbonate which exchanges acids with the calcium as follows:

| Calcium Sulphate | | Sodium Carbonate | | Calcium Carbonate | | Sodium Sulphate |
|---|---|---|---|---|---|---|
| $CaSO_4$ | + | $Na_2CO_3$ | = | $CaCO_3$ | + | $Na_2SO_4$ |

We then have, suspended in the water, calcium carbonate which at once begins to settle, and, dissolved, approximately ten grains of sodium sulphate, which is harmless.

If our hard water happens to be muddy, the fine particles of floating mud are carried down by the larger particles of carbonate of lime as they settle, and so efficiently that no filtering process compares with this in speed and cheapness. If we are treating water from near coal mines, which contains free sulphuric acid, we neutralize it by the same reagents.

The next paper will trace the development of the art, and describe and illustrate the best methods and apparatus for accomplishing this work on a large scale.

## WATER SUPPLY OF JERSEY CITY

### Special Conditions Treated in Annual Report—Terms of Contract—High Rate of Consumption

THE appearance of the report of the Board of Street and Water Commissioners of Jersey City, N. J., covering the fiscal year ended November 20, 1905, serves as a reminder of the special conditions affecting the water supply of that city. A contract entered into on February 28, 1899, between the city and Mr. P. H. Flynn, of Brooklyn, N. Y., provided for the construction, by the latter, of new works for securing a supply of water from the Rockaway River at Old Boonton, the arrangements at the intake including a storage reservoir having an area of 949 acres, a maximum depth of 102 feet, and a total capacity of 7,362 million gallons. A masonry reservoir dam, carried to a height of 105 feet, exclusive of foundation, is a feature of the plant, which also includes over seventeen miles of 72-inch steel conduit and two tunnels, respectively 1,094 feet and 7,212 feet long. The watershed contributory to the storage reservoir has an area of 122 square miles.

The terms of the contract provide for a total daily supply of 50 million gallons, with an eventual increase to 70 million gallons. The city is called upon to pay to the constructor of the works, for each million gallons up to 25 millions per day, $36; for each million gallons in excess of 25 millions and up to 30 millions, $34; between 30 and 35 millions, $32; between 35 and 45 millions, $24, and beyond 45 millions, up to the limit of capacity of the works, $20. The contract also includes an option, enabling the city to exercise the right of purchasing the entire undertaking for sums varying between $7,595,000 and $9,245,000, according to the existing capacity provided and the date at which the transfer is effected.

The works are now in use, but the situation is complicated by the fact that the constructing party to the contract, with but a few hours' notice to the city, turned on the supply, notwithstanding the known objections, on the part of the city, to this course, certain matters of settlement being at that time in abeyance. This condition practically obtains to-day, as, under a court order, the city is now paying the contractor interest at the rate of 4 per cent. on the contract price of $7,595,000, plus $50,000 per annum for the care and maintenance of the works. This will continue until the trial of a suit in which the city alleges deviations from the specifications and instructions of the engineer and delay in completing the works. The sums named are in addition to the charges per million gallons, already referred to. The contract does not include distribution of the supply, which is delivered by the contractor at the city boundary. In the suit, still pending, one of the city's contentions is that the contractor, by his arbitrary action, failed to turn over the completed work for a three months' test, as called for in the specifications.

The present population served is about 250,000, representing an average daily consumption of 33 million gallons at 130 gallons per head. This high rate of consumption has engaged the attention of successive boards. Thus, a special report by Chief Engineer C. A. Van Keuren, as far back as February, 1900, gave prominence to this factor of water works administration, and embodied a strong recommendation in favor of the general adoption of the meter system. It was estimated that, with a then consumption of 30 million gallons per day, a saving of one-third could be effected, although even at that time one-third of the total volume supplied was passed through meters. The cost of purchasing and setting 25,000 meters was estimated at $575,000, while it was shown that, under a reasonable scale of charges, a sufficient revenue would be provided to cover all the expenses of the Water Department, including payments to the East Jersey Water Company for the total volume used. The Board's report for the year ended November 30, 1902, shows that partial action had been taken in this direction, about a thousand meters having been installed "in an effort to compel a certain class of customers to be fairly economical in the use of water."

# JOINTING OF SEWER AND DRAIN PIPES*

## Bituminous Mixture Recommended in Preference to Cement and Pure Bitumen—Satisfactory Tests Obtained—Defects of Joints Under Varying Conditions

WATER-TIGHT joints in stoneware pipes are necessary to prevent the pollution of air, soil and water about human habitations, as is evidenced by the many forms of patent joints now on the market. Instead of dealing with the form of socket, the author believes that attention should have been given to the cementing materials. Portland cement joints, widely used, may make tight joints at first, but after a few years these show leaks. Illustrating in detail the defects of such joints, the author states that whether "with or without gaskin, there is a tendency for the soft cement, during setting, to leave the upper part of the socket at A, and to bulge out at B, as shown in Fig. 1.

"In a patent joint with a cavity, the Portland cement in the form of grout is run in and worked round with a cane or other appliance to exclude the air and entirely fill the cavity with cement. In this case the heavy particles of the cement settled to the bottom of the joint, and left the liquid portion at the top, before setting took place. On testing this joint after forty-eight hours' exposure to air the upper part showed signs of leakage:

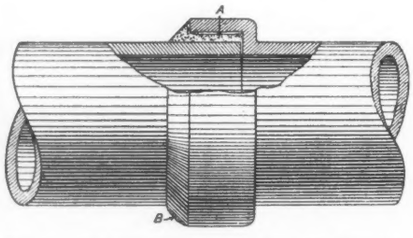



FIG. 1.—CEMENT JOINT, BULGING AT BOTTOM.

on examination, the density of the cement was clearly greatest at the lower part of the joint, and may be likened to the shading of the cement in Fig. 2.

"In another case the ordinary cement joints were made with dry spigots and sockets (not dried specially); shortly after setting, cracks began to develop in the cement. . . . The insertion of gaskin made no difference.

"Pipes of the same kind were soaked in water and jointed with the cement mixed for the previous example by the same workman. Though the joints have been made some time, no defects are noticeable. . . . A remarkable feature of cement joints is the small amount of hold that the cement, when set, has upon stoneware pipes; this is clearly shown by breaking a pipe joint.

"In the joints without gaskin, or a substitute for it, there is great difficulty in preventing the cement, when in a soft state, passing round the end of the pipe and forming a ridge on the inside. The removal of this ridge may disturb the partly set cement in the joint, or a slight disturbance of the pipe may break the joint and cause leakage. Provision must be made to prevent this. The use of a small ring of gaskin does not reduce the strength of the joint, but a ring of fine plain gaskin, thoroughly soaked in cement, forced solid to the end of the socket, enables a cement joint to withstand higher pressure than if cement alone were used. A joint that will withstand considerable pressure may be made by filling and calking the socket with plain fine gaskin, thoroughly soaked with liquid cement, and afterward painting the face of the socket, as shown in Fig. 3. A joint of this kind has been made for inspection, and will with safety withstand forty feet head of water. I cannot say what effect the gaskin has upon the life of the cement, though joints of this kind made seventeen years ago are still withstanding a constant pressure of eighteen feet head of water."

With care a cement joint may be made tight for a time, but the expansion of the cement long after setting makes

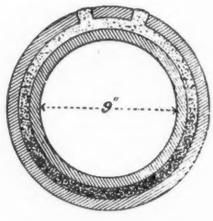



FIG. 2.—CEMENT JOINT, COARSE MATERIAL AT BOTTOM.

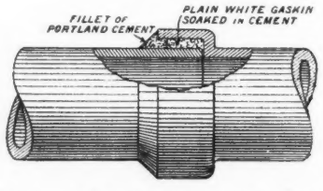



FIG. 3.—CEMENT JOINT WITH GASKIN.

it an unreliable material in the long run. The amount of expansion of cement is variable and has been noted by the author as one-fourth inch in a length equal to the circumference of a 12-inch pipe. Besides its inherent faults for such work, there is the practical difficulty that the principal part of the cement used for pipe laying is purchased by contractors in the cheapest market and frequently in small quantities.

The theoretical properties of a material suitable for pipe joints would be: reasonableness in cost; ease in application; physical stability in reference to temperature; elasticity—sufficient to prevent leakage in case of settlement; adhesiveness; quickness in setting to permit testing before the joints are covered.

*Abstract of a paper read before the Manchester (England) Sessional Meeting of the Royal Sanitary Institute, by J. E. Radcliffe, Professor of Sanitary Engineering, Municipal School of Technology, Manchester.

Sulphur, which the author tried, is too difficult to handle and makes an inelastic joint. Mixtures of sulphur and bitumen separate easily and have not many points of superiority over pure sulphur. Various bitumens and coal tars were tried with better success. Two important points were brought out, namely, that coal tar pitch alone is unsuitable and that other bitumens mixed

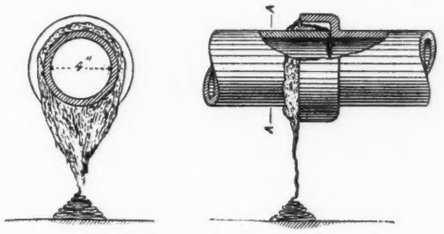


FIG. 4.—BITUMINOUS JOINT,—TOO SOFT.

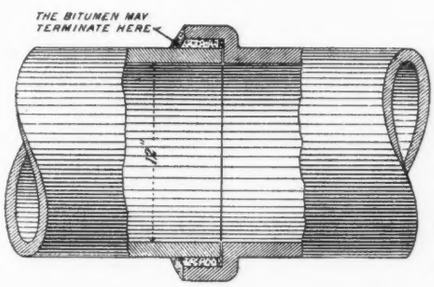



FIG. 5.—AUTHOR'S BAR AND MASTIC JOINT—PERFECT.

with much oil should not be used, as a creeping action sets up which empties the socket, as shown in Fig. 4. Defective material of this sort may be avoided by noting the melting point, which should be considerably above the temperature to which the pipes will be subjected.

"The best results were obtained by carefully heating three parts of natural rock asphalt (hard mastic) with the addition of one part of coal-tar pitch and one part of fine, clean sand (the pitch and sand were heated and mixed before being placed in the asphalt); the pitch caused the heated mass to liquefy sufficiently to run into the joints of the pipes (ordinary and patent)."

The author prefers to so balance the mixture that the temperature at which the material creeps is as high as possible, and he has been able to handle a compound that does not creep at 100° C. The cost of this preparation is reasonable—even less than that of Portland cement, as there need be no waste. "With proper care in the preparation, there will be no failure due to variation of temperature, expansion, contraction, vibration or natural decay." Lengths of pipe placed before the meeting for inspection, jointed three years before, stood an air pressure of four pounds per square inch without leakage. Pipes of large diameter may be jointed by this process, a 12-inch joint being shown in Fig. 5. It is then advisable to pour the bituminous mixture from a pan with a valve in the bottom, so that the joints may be run without break. For pipes larger than 9-inch, clips to fit the joint should be used. The author wishes it clearly understood that the results of experiments carried out in the laboratory have been thoroughly tested in actual work.

## A Seaside Sewage Plant

NEW ROCHELLE, N. Y., has a sewage disposal plant, built about eleven years ago, which is still a matter of interest to city officials generally, and has been visited during the past year by several committees from cities desiring to purify their sewage. The plant consists of five concrete sedimentation tanks, each 66 feet long by 22 feet wide, with an average depth of 6¾ feet. The plant is modeled upon the sewage disposal works of Worcester, Mass. The sewage, on arrival at the plant, is treated with milk of lime, and at a point a little further on in the channel ferrous-sulphate is added. The channel, provided with baffle plates to assist in mixing, conveys the sewage over weirs into the various tanks, these being so arranged as to enable any number to be used or cut off.

About twice a week a tank has to be cut off from the circuit and emptied, when the sludge is pushed through a drain into the sludge tank. From this it is pumped on to filter beds, with a depth of two feet of cinders; in about five days, if the weather is fair, the comparatively dry sludge is wheeled away and disposed of to farmers. The effluent from the settling tanks is tested from time to time with aniline to verify its alkalinity, and from the plant flows through a pipe and is discharged on the seashore, where it creates no offense.

The plant has a capacity of 750,000 gallons per day and cost about $19,000. The annual cost of operation is from $4,000 to $5,000. Assuming the average amount of sewage handled at 500,000 gallons—it is less in winter and more in summer—the cost of clarification may be estimated at $25 per million gallons. The area draining into the plant contains a population of about 6,000.

Regular quantitative determinations of the amount of organic matter in the sewage, before and after treatment, have not been made, the city officials being satisfied with their success in abating the nuisance previously created at the seashore. Permanganate tests of raw and treated sewage indicate a satisfactory reduction of the organic constituents, the percentage necessarily varying according to the amount of chemicals used; 400 pounds of lime and 250 pounds of sulphate are considered sufficient to clarify 500,000 gallons.

## Effect of Fire on Concrete

THE heat-resisting properties of concrete are a prominent subject of discussion among engineers and fire department officials. A recent fire at Duluth, which destroyed a part of the large Peavy elevator plant, has afforded a test on a large scale, and local reports show that the material came off with all the honors of the contest. Thirty-five circular bins, 110 feet high, with a capacity of four million bushels, directly faced the "crib" or working elevator, the latter being completely destroyed by flames whose heat broke glass in buildings half-a-mile across the bay. The bins were of steel framework, covered with concrete; they are entirely unharmed and the walls are not even blackened, the fierce heat having burned off the smoke.

# SEWAGE DISPOSAL ON THE ATLANTIC COAST*

**Investigations in Progress—Work of British Royal Commission and Massachusetts Board of Health—Other Bodies Interested—Final Treatment of Local Sewage**

THE speaker introduced his subject by a reference to the notable additions made, during the last two years, to the evidence bearing on sewage disposal in general and expressed his desire to touch briefly thereon, with more particular reference to the practical conclusions available.

Since 1898, the British Royal Commission on Sewage Disposal has conducted experiments and issued reports on the various subjects coming under its jurisdiction. The infection of shell fish, due to the pollution of sea coast waters, and the life of disease germs, such as those of typhoid fever, in such waters, formed the subject of a report almost twenty months ago. It is estimated that in London and Manchester from 8 to 10 per cent. of all typhoid fever in those cities is due to infected shell fish, while in several seaport towns 50 per cent. of that disease could be attributed to this cause. Investigations along the same lines have been made by the Massachusetts State Board of Health, which passes upon all improvements in the cities and towns of that State having reference to water supply and sewage disposal.

In a majority of instances improvement is necessary in the method of sewage disposal by seaport towns. The method of dilution, generally employed, is, when well carried out, reasonably satisfactory, but the sewage is frequently not brought quickly enough to deep water, where adequate currents exist to disperse it. "There is a tendency in many places to allow the outfall sewers to stop on flats exposed at low tide, or in shallow water, rather than to convey the sewage to deep water where the outfalls are suitably located and submerged at all times." When shell fish exist in the vicinity the matter assumes a different phase. That portion of New York City located on Manhattan Island is probably the best situated city in the world for the disposal of sewage by dilution. The present arrangements could be improved, however, by extending the sewers to or beyond the pier lines, and having sewage discharged, after screening, well below the surface of the water.

Even when suspended particles of visible size are removed, there still remains the objectionable features of odors and of "sleek"—the latter being the film of grease found near the outfalls of sewers. These factors vary with the volume of discharge, and it is an undetermined question how much sewage can be discharged from a single outfall; at Deer Island, Boston Harbor, the daily discharge is 50 million gallons. Odors are rarely noticed at a distance of a quarter of a mile—about the same range within which the odor is noticeable in modern European works. The "sleek" is visible, in calm weather, at a distance of a mile, and methods of removing grease and of aerating sewage to reduce the odors offer fruitful fields of investigation.

"Where shell fish are found in seacoast waters, the sewage of neighboring cities should be disposed of according to the relative financial importance of the shellfish industry and of the cost of purification of the sewage. . . . Where the shellfish industry is large and the necessary sewage works comparatively small and inexpensive the logical thing to do is to purify the sewage thoroughly," as is done in inland cities where neighboring water supplies have to be protected.

Simplest among the types of works for the artificial treatment of sewage are those providing for sedimentation. These are so constructed as to allow sewage to flow through shallow reservoirs holding from two to twelve hours' flow. In basins of this sort, from 50 to 70 per cent. of coarse suspended matters settle out, and about the same percentage of bacteria is likewise removed. In reality, both this method and chemical precipitation, with which it is allied, are not purification but clarification, and they are both best applied as a preparatory treatment. Chemical precipitation is on much the same footing, and, as practiced in Europe, removes from 80 to 90 per cent. of the suspended matters and bacteria. Septic treatment is simply sedimentation modified by the practice of allowing the sludge to remain for a long time on the bottom of a reservoir, holding at least eight hours' flow, and to purify there through bacterial action. This process eliminates, by transformation into liquids and gases, half of the matter deposited from the sewage. "The septic tank is a helpful preparatory step, as it puts the sewage in shape to be treated by some method of filtration more advantageously and reduces the cost of sludge disposed." The methods of sedimentation, septic treatment and chemical treatment are to be considered as preparatory methods. "Effluents of all these treatments are putrescible, and, as above stated, ordinarily require subsequent filtration, although there are cases, apparently, where any one of these methods may suffice for the present in eliminating nuisances."

For final treatment of sewage, where local conditions require a non-putrescible effluent, some system of filtration is necessary, intermittent filtration through sand being the system employed at fifteen or twenty places in New England. In expressing his opinion on the value of the method, the speaker continued: "Where the filters are not overcrowded, the resulting effluents are practically clear, odorless, and contain only about 1 per cent.

* Abstract of an address, by George W. Fuller, M. Am. Soc. C. E., delivered before a meeting of the New Jersey Sanitary Association, held at Lakewood, N. J.

of the applied bacteria. The organic matter in the sewage is reduced much below that necessary to secure a non-putrescible effluent. One acre of land disposes of the sewage of from 500 to 1,000 persons, depending upon the porosity of the sand, care of filters, preliminary treatment of sewage, etc. Higher rates can be used, but it means more care and expense in keeping the filter surface free from clogging for winter work. Experience has shown that intermittent sand filtration is much more expensive than was thought to be the case some years ago. In fact, the experience of the last ten years in Massachusetts (see 1903 report of State Board of Health) with sand filters shows that the cost of these filters approximates, on an average, about 43 cents per capita per annum, divided about equally between capital charges (5 per cent. per annum) and maintenance. This cost has nothing whatever to do with the collection system of sewers in the city, nor with the conveyance or pumping of the sewage to the disposal works. It is solely for the purification of the sewage."

Another system of final treatment of sewage consists in the use of sprinkling or contact filters, both of which methods, while they have been studied at Lawrence and other places in this country, have been developed more largely in England and Germany. These filters, delivering a non-putrescible effluent, are, as a rule, cheaper than intermittent sand filters and, judging from recent evidence in this country and abroad, have a field of usefulness, even where high bacterial efficiency is required. These coarse grain or rapid filters, the speaker continued, "are perfectly capable in connection with a suitable preparatory treatment to produce a non-putrescible effluent containing about fifty parts per million of suspended matter and about 10 per cent. of the bacteria in the raw sewage. Such a liquid is comparable with a turbid river water which is highly polluted with sewage. In other words, coarse grain filters reduce a sewage to a state where it can be subjected to the treatment applied for the purification of drinking water from turbid and polluted rivers. Mechanical filtration along the lines carefully worked out during the past ten years is perfectly capable of converting the effluent of coarse grain filters to a state of bacterial purity fully equal to that obtained by intermittent sand filters. This combined treatment is apparently cheaper than intermittent sand filtration for large projects, even where sand is fairly accessible. For small plants there is probably no economy. Where the dividing line comes in conditions favoring one or the other of these methods of purification can hardly be stated at present. It is a topic, however, upon which much will be said in future.

"The application of copper sulphate or other germicides to the effluent of coarse grain filters is another way of securing a final product of high bacterial purity. It is probably more expensive and no more effective than a final filtration as above mentioned. For small plants it is nevertheless of value.

"Preparatory treatment of the raw sewage to remove the sludge is highly desirable for nearly all large projects. For small ones it is not necessary where the sewage is treated by sand filters or sprinkling filters. Contact filters under all circumstances are operated to better advantage with a clarified sewage. Septic tanks are the best preparatory devices for ordinary conditions.

"All of these remarks are directed to domestic sewage containing only small or moderate amounts of trade wastes. Large quantities of trade wastes increase the difficulty and expense of purification very materially. Trade wastes vary so in their character that each case requires special consideration, and there is very little to be said in general terms."

Two years ago the city of Columbus, Ohio, appropriated a liberal sum of money to make a series of tests on local sewage. Important general conclusions have been reached and "it was found that the best preparatory treatment was afforded by septic tanks holding an average flow of about eight hours. This caused a removal of about two-thirds of the bacteria and suspended matter in the sewage. About one-half of the deposited sludge is liquefied and gasified. No trouble with odors was encountered.

"Sprinkling filters operated at an average rate of 2 million gallons per acre daily form the next step in the process. It was found that winter weather, even in the severe climate of Columbus, did not seriously interfere with spraying the sewage on the filters. A non-putrescible effluent was obtained, containing about 10 per cent. of the original bacteria. Contact filters could produce an equal result when operated only at about one-fourth to one-third of the above stated rate for sprinkling filters. Further, there is less clogging in sprinkling filters than in contact filters, due to the suspended matter retained as films within the sprinkling filter cracking and peeling when the filter is rested (every other week). This removal of stored suspended matter is one of the chief characteristics of sprinkling filters. It makes the effluent somewhat unsightly in appearance, but this is readily corrected by passing the effluent through a small settling basin holding two or three hours' flow."

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### An Improvement Report

A COMPREHENSIVE report on the "Improvement of Columbia, S. C.," prepared for the Civic Improvement League of that city by Kelsey & Guild, of Boston, Mass., will be issued in a few days in pamphlet form by the J. Horace Macfarlan Press, Harrisburg, Pa. The booklet of 88 pages will be beautifully illustrated with half-tone engravings and colored maps showing the proposed improvements. As this is the first report of the kind which has been made for a Southern city, an unusual degree of interest attaches to it, and it will be of value to improvement workers generally. Copies may be obtained from Miss Belle Williams, President, Civic Improvement League, Columbia, S. C., for 50 cents each.

# PROGRESS IN NEW YORK POLICE FORCE

**Improvement Along Various Lines Since President Roosevelt Was Commissioner in 1897—Three-platoon System, Traffic Squad and Other Reforms—Gen. Bingham's Plans**

In 1895, when the Strong administration came into power, the Police Department, as well as others, were in a condition badly needing reform. Ex-Police Commissioner Theodore Roosevelt wrote, in 1897, "A few well-meaning persons have at times tried to show that this corruption was not so very great. . . . In reality, it would be difficult to overestimate the utter rottenness of many branches of the city administration." Taking hold of the Department in this condition, the Commission of which he was President, by a persistent policy of punishing offenders and rewarding faithful officers, soon brought the force to a degree of efficiency which New Yorkers had supposed impossible. Frequent personal inspections, by day and night, of the workings of the Department and the employment of plain-clothes men to ferret out offenders were some of the means employed by the Commissioners. High physical standards, as well as character and intelligence, were required of patrolmen, and many a veteran with a good record, but whose girth was too great, was sent to patrol long beats in the outlying districts. Deeds of daring and personal prowess were rewarded by a medal or certificate—decorations which were of consequence in securing promotion, especially in the lower grades; in the higher positions, executive capacity had of course to be considered. The Commission was not slow in discharging men for cause—a procedure, in the case of a man of influence, unheard of under the old regime. In all, two hundred men were discharged, seventeen hundred appointed and one hundred and thirty promoted. In addition to improvements in the general *morale* of the force some definite administrative reforms were introduced. The Bertillon system of identifying criminals by a system of measurements was adopted. A squad of bicycle policemen was organized to patrol the crowded Boulevard, Riverside Drive and some outlying districts. Tramp lodging-houses were abolished and municipal lodging houses established, in which lodgers were obliged to take baths and do other things offensive to their instincts. In co-operation with the Street Cleaning Department, at the request of Col. Waring, truckmen were compelled to remove their empty wagons from the streets, where they had hitherto been permitted to remain. For the most part, the reforms in methods and organization brought about by this regime have persisted up to the present time.

For a number of years succeeding this period, the Police Department struggled along under a bi-partisan Police Commission of four members. Of such a Commission, Mayor Seth Low wrote, "Until it becomes wise to place an army under the charge of four generals, it cannot be wise to place a police department under the control of four men. The founders of this Republic committed all the great administrative affairs of the general government to a single head. Our cities do not show their wisdom in departing from this practice." During the administration of the bi-partisan Board the supervision of elections was assumed by the State, although the Police Department still retained some responsibility. However, that the efficiency of the police force as a guardian of the peace had not been seriously impaired was demonstrated by its very creditable work in handling the Brooklyn, and later, the Manhattan street railway strike in the summer of 1899. As a result of prompt suppression of lawlessness at the start, no lives were lost or property destroyed—except as the result of an accident to a car. The executive head of the police at this time—William Devery—attributes the success in handling this strike largely to the policy adopted of detailing many plain-clothes men to mix with the strikers and ride in the street cars—not forgetting to carry their night sticks, which they were obliged to use on more than one occasion.

The year 1900 was the last full year during which the bi-partisan Board of four members controlled the Police Department, being replaced early in the following year by a single Commissioner. Creditable work was done by the police during this year. At the annual parade, the Rhinlander and Peter F. Meyer medals for distinguished bravery, just become available through trust funds, were presented. In August a riot which threatened to become a race war was promptly suppressed by the vigorous action of the police in arresting depredators and dispersing rioters. During the fall of the same year, the National election was the occasion of several immense public meetings; the crowds were handled by the police in such a way as to earn the thanks and commendation of the chairmen of both political paries.

Early in the year 1901, M. C. Murphy was appointed Police Commissioner by Mayor Van Wyck in place of the bi-partisan Board abolished by the Legislature. The efficiency of this change was demonstrated by improvements in the organization brought about by closer relations between the police systems of Brooklyn and those of other boroughs, with police headquarters in Manhattan. The three-platoon system was adopted in this year and has remained, with some modifications, ever since. In his annual report, Commissioner Murphy recommended extensive improvements in the Brooklyn service which were carried out under succeeding administrations; these were extensions of the patrol signal system, placing telephone and telegraph wires belonging to the Department in underground conduits, and other minor matters.

In 1902, these improvements and others were carried

out by Commissioner Partridge, who had had previous police experience in Brooklyn. Under his administration there was a notable increase in the number of patrol wagons; the number in use was more than doubled, making the total at the end of the year 140. The customary annual parade was omitted, "for the good of the service," this year—the only time in the history of the Department. Active efforts were made to correct abuses which had grown up in the Department, particularly in the matter of gambling and the infamous cadet system. In this matter the Commissioner had the assistance of a legislative investigating committee. Unusual prominence was given to the matter of harbor patrol in protecting the East River Tunnel work carried on by the Rapid Transit Commission. During the visit of Prince Henry of Prussia, on the Royal yacht "Hohenzollern," the police boat, "Patrol," with a detail of men, was constantly on guard and escorted the Prince on all trips he took on the water.

In the year 1903, the policy pursued by the Strong administration years before was followed in selecting a man who had had previous successful experience in the administration of public affairs, General F. V. Greene being appointed Commissioner. On the first day of his administration he announced in no uncertain way that during his term of office some initiative would be with the Commissioner. In recent years, plain-clothes men belonging to the several precincts had been in the habit of spending a good deal of time at police headquarters; they were given twenty-four hours to remove themselves and their belongings to their own precincts. Under Greene's administration the force resumed the soldierly appearance it had had under Commissioner Roosevelt. Warfare was waged against gamblers, and the police organization was maintained in a high state of efficiency. To improve the service, foreign experience was appealed to, and Captain Piper was sent abroad to study methods employed in London and other European capitals. On his return an effort was made to control street traffic by the system in use in London. Pamphlets were distributed among truckmen and drivers, containing the new rules of the road. "Isles of Safety" were established, these being narrow platforms slightly elevated above the street pavement, serving as a secure resting place for persons crossing the street and separating the lines of traffic moving in opposite directions.

It remained for Commissioner McAdoo, appointed in 1904, to bring the traffic regulations to their present state of perfection. This was accomplished by the formation of a Bureau for the regulation of traffic, composed of mounted as well as unmounted men. For many years some mounted men had been used in the outlying districts, patrolling long beats, and others were on duty along crowded drives in Harlem. These men, who had acquired well deserved fame for their skill and daring in the capture of runaways, formed the nucleus of the mounted traffic squad and others were regularly trained for the purpose. Foot and mounted men were stationed at the intersections of the principal streets to control the traffic by alternately allowing it to proceed along one street and then along the other. At the start they had a hard struggle to make drivers understand and obey their signals; but as the system become better understood and the advantage to the drivers themselves became known, trouble of that sort ceased and now all a policeman has to do is to hold up his hand. In addition to their work at intersecting streets, it is the duty of the traffic squads to establish zones of safety; these are roped areas, principally in public squares, which confine traffic to definite lines; these areas form a protection to people who can proceed along the ropes in security or cross the line of wagon-traffic knowing that they need only watch for wagons moving in one direction. Before this system was established blockades and accidents were caused by drivers crowding their vehicles into the side of a line of moving wagons. At one danger spot, the approach to the Brooklyn Bridge, the sound of the ambulance gong used to be about as constant as the noise of the street; now, accidents rarely happen there; in fact, street accidents from all causes have decreased 70 per cent. since the establishment of the traffic regulations.

Commissioner Gen. Theodore A. Bingham succeeded Commissioner McAdoo on January 1, 1906. He has made it evident that he intends to maintain the highest standards in the Department and to strengthen it where, in his judgment, it is weak. The complaint has been made for many years, by all Commissioners, that the Department is understaffed to the extent of a thousand men. Commissioner Bingham intends to increase the force in outlying and other insufficiently protected districts by abolishing some special squads, some of which are engaged in work of a semi-private nature, such as guarding the Grand Central Station and the wharves of the great passenger steamer lines. It is reported at headquarters that many of the mounted men attached to the traffic squad will be returned to their former duties.

During the past decade the Police Department has increased in numbers 75 per cent., and in value of equipment to at least an equal extent. The following table shows the organization of the Department in 1896, and on February 1, of this year:

| Organization of Department. | 1896 | 1906 |
|---|---|---|
| Commissioners | 4 | 1 |
| Deputy-Commissioners | | 3 |
| Inspectors | 7 | 16 |
| Surgeons | 16 | 23 |
| Captains | 40 | 85 |
| Sergeants | 173 | 411 |
| Detective sergeants | 50 | 251 |
| Roundsmen | 202 | 577 |
| Patrolmen | 4,454 | 7,211 |
| Miscellaneous | 106 | 275 |
| Total | 5,052 | 8,853 |

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It is also desired that the facilities furnished by the reference library in this office should be widely known and freely used by those interested in municipal affairs. Visitors will be welcomed and provided with conveniences for search, and inquiries by mail will be promptly dealt with.

NEW YORK, APRIL 4, 1906.

## State Action on Stream Purification

THERE occurred in Philadelphia, on March 10, a somewhat unique meeting of officials from different States to consider certain matters of common interest. At this meeting the Governors and State health authorities of Pennsylvania and New Jersey met to discuss methods of preventing the pollution of the Delaware river, which forms the boundary between these two States. Not the least notable feature was that the request came from Pennsylvania, which a year ago had the least effective laws on stream pollution of any of the North Atlantic States, to New Jersey, which has been considered to be one of the two or three States having on their statute books the most stringent laws on this subject. Whether or not the outcome of this conference shall be all which is hoped for, an example has been set for other States which have been waiting for the general government to relieve them of nuisances claimed to be caused to their detriment by neighboring States; and a contrast has been offered to the action of Missouri, whose suit in the United States Supreme Count against the State of Illinois for Chicago's alleged pollution of the Mississippi has recently been decided against Missouri, which is itself living in a very fragile glass house.

The fact that Pennsylvania has by her statutes of 1905 at last placed herself in position to ask such co-operation of New Jersey is a sign of progress encouraging to sanitarians throughout the country. Dr. Dixon, Commissioner of the State Department of Health of Pennsylvania, stated at the meeting referred to: "Work is now going on throughout the State to restore the streams to their original purity as fast as the industries which have been permitted to grow up without proper sanitary supervision will permit. In this great and important work those charged with the responsibility have been ever mindful of Pennsylvania's sister States. The city of Wilmington, Del., is now profiting by the improved condition of the Brandywine creek, from which she takes water for domestic purposes."

It is to be hoped that this commendable activity will serve as a further stimulus to other States to live up to the full duty of modern communities in this matter. (Delaware, herself, for instance, should look to the purification of her own streams; she has now no State statutes for effecting this.) The Delaware is not the only, nor by any means the worst, polluted stream in the country; and even Pennsylvania's past condition as to anti-pollution statutes was far better than that existing in most other States.

There is by no means unanimity of opinion as to how far the preservation of the purity of our streams should be enforced. Even the laws of Massachusetts, New York, New Jersey and Pennsylvania—the most stringent of all our State laws—give to their State Boards of Health discretion in permitting municipal sewage to be discharged into streams, and permission to do so has been granted to many cities and towns in each of these States. All will agree, however, that the rendering of a stream offensive to sight or smell is an indefensible nuisance and should be prohibited as such. On the other hand, it has not yet been found practicable to so far purify sewage that its effluent shall be at all times free from pathogenic bacteria, this being difficult even in experimental stations. If even purified sewage, therefore, be discharged into a stream, it would seem that further treatment of water therefrom is necessary to render it *absolutely* safe for domestic purposes; or, in other words, streams cannot practically be kept perfectly "safe." The question is, how much pollution shall be permitted? It can hardly be expected that it will ever be possible to formulate a hard and fast rule governing this, but each case must be decided upon its own merits by unprejudiced experts. There may be some cases where the discharge of crude sewage into a stream is justifiable; others where only the purest practicable effluent is admissible; although in most cases a more or less complete purification is desirable. The data upon which experts can base such decision are yet all too meager and indefinite (although the above statements are pretty well established) but every year brings its increments thereto. Probably never before has so considerable an amount of authoritative opinion upon this subject been collected as is represented by the expert evidence in the Missouri-Illinois suit above referred to, the meat of which the JOURNAL hopes to be able to present to its readers in the near future.

## An American Utopia

IN a recent University Extension lecture Prof. Charles Zueblin enumerated the various ideals of city life, contrasting these with conditions only too commonly prevailing at the present time. There can be little doubt, if one may judge the eminent social economist by his suggestions in this respect, that he occupies an advanced posi-

tion in the advocacy of civil intervention, the provision of municipal lodging houses and laundries being merely typical instances of his desires. Like all who have taken up the study of physical and moral development, he is a believer in catching his subjects young enough—the school being singled out as a conspicuous target for his condemnation, in so far as defective heating and ventilation are concerned. He advocates medical attendance of children attending the public schools and a discrimination as between those of robust and delicate health in regard to the tasks imposed. In other words, while realizing the difficulties involved in training a child by going back to its grandparents—the ideal method—he proposes that the grandchildren of the children of to-day shall have all the benefits derivable from a course of hygienic and moral training extending over three generations.

Generalities of this kind are not without their value. Purer air, better water, cleaner streets, improved personal hygiene have all been used, and used with success, as slogans in the attack upon insanitary conditions. It is only when these are left behind, their places being taken by concrete suggestion and advice, that the idealist advocate runs the risk of criticism at the hands of more practical if less enthusiastic counsellors. Take, for instance, the Professor's dictum that every city situated as Toledo should have two distinct systems of water supply —one, a filtration plant, for drinking, cooking and bathing purposes; the other, a high-pressure plant, designed primarily for fire protection. Dual supplies have existed in the past; at least one example survives in England to-day, but in that instance the efforts exerted during many years toward its abolition are now nearing fruition, and Shrewsbury will soon be, in this respect, as other British cities. Again, it is at least doubtful whether the volume of water used for fire extinction forms a sufficiently large proportion of the total supply to justify the expense of installing a separate high-pressure system, especially when it is remembered that under modern conditions it is indispensable that the potable supply be also delivered in the topmost stories of the highest houses. When a dual supply was proposed for London several years ago—before the water companies had shown what could be effected, in practice, by filtration on a large scale—the fire demands were to be met from the proposed new "pure-water" system, the apparent extravagance being amply justified when the smallness of the actual fire demands was disclosed. These demands, it is true, are larger in America, but their true proportion would be a primary factor in any decision of this character.

In the matter of public laundries, Professor Zueblin urges their provision by the municipality as making for better sanitary conditions, besides taking the drudgery of wash-day out of the home. But English experience teaches that with the erection of improved working-class homes the need for public laundries disappears, as was pointed out in a brief article on page 288 of THE MUNICIPAL JOURNAL AND ENGINEER for December, 1905. Granting the advantages of joint user in this respect, this can best be secured by that extension of co-operative living which is more highly developed in America than in Great Britain. It may at least be doubted whether the Professor is prepared to indorse a scheme for the municipal supply of apartment houses, in which joint kitchens and laundries take the place of the present individual facilities for cooking and washing.

## IMPORTANT ANNOUNCEMENT

### The Collection and Disposal of Municipal Waste

This is one of the most perplexing and important questions connected with the administrative work of American cities and towns.

There is a great desire to obtain the latest and most reliable data that can be had. This is attended with difficulty because of the absence of detailed, tabulated information that may be used for comparison for the assistance of town officials.

There are no American books on the subject, only a number of papers, reports and small pamphlets, mostly written by interested parties who are desirous of presenting the most attractive side of their particular process or apparatus. This data is always conflicting, and often very confusing and inaccurate. It cannot be taken as representing the general situation, nor as conveying accurate information, except that in regard to one or another of many plans, schemes, systems, apparatus and processes that are persistently forced upon the attention of the municipal authorities.

THE MUNICIPAL JOURNAL has in past years given much space and interest to this branch of city housekeeping, and believes that the time has come for a thorough, accurate and complete survey of what has gone before, what is now doing and what may be looked for in the future.

In order to put present available knowledge of the subject at the service of its readers, THE MUNICIPAL JOURNAL is publishing a series of articles written by Mr. Wm. F. Morse, Sanitary Engineer, of New York City.

Mr. Morse was among the first to take up this subject in a practical way, in 1889, and has been connected with it constantly since then. He has designed and built a large number of disposal plants, several disinfecting and special incinerating installations, some of these being the most important in use. He is a member of several engineering, civic, educational and sanitary associations, and his papers and other writings contributed to these place him among the standard authorities on the subject of waste disposal.

THIS SERIES

of articles, begun in the February number, will be continued through the year, and will be illustrated by original drawings, cuts, diagrams and pictures, and will contain many tables valuable for reference.

The following list indicates the subjects treated by the author:

The Waste Collection Service in American Towns; methods and results.

Definition of Terms; Quantities; Proportions; Character of Waste in General.

Garbage; Analysis; Proportions; Values.

Dry Refuse and Rubbish; Quantities and Treatment.

Ashes; Analysis; Proportions; Values.

Street Sweepings; Fertilizing Value and Treatment.

Cost of Collection Service by Different Methods.

Methods of Disposal; Reduction; Incineration.

Beginning and Progress of Disposal by Cremation.

Apparatus and Furnaces; Record of Work; Results.

Types of Furnaces; Their Employment; Municipal, Institutional, Industrial, Medical, Laboratory (fully illustrated).

Calorific Value of Waste as Fuel (comparative table).

Reduction and Extraction Processes Described and Illustrated; the Earlier and Later Methods.

Foreign Destructors; Special Chapter by an Eminent Authority.

American Methods; Col. Waring and His Successors.

Present Situation in this Country; Résumé.

Means for Improvement as Suggested by Several Investigators.

What May be Expected of the Future.

### Dalrymple to Dunne

Manager Dalrymple conveys to Mayor Dunne, on behalf of the Lord Provost and City Council of Glasgow, thanks for the honor conferred on them for looking to their city for information and advice on the operation of street railways. From the day he landed in New York, Mr. Dalrymple endeavored, through the press and private interviews with the Mayor and his associates in the city government of Chicago, to tell what the municipality of Glasgow has done and how it has made a conspicuous success of the management of public utilities—including the street railways. It is now an accepted principle in Britain that all public utilities be under the control of the municipality. He was not surprised that the citizens of Chicago were so anxious that a change be made at once and that Mayor Dunne had been triumphantly elected on his assurance that he would take immediate steps to have the street railways oprated by the municipality. During his stay in Chicago, Mr. Dalrymple devoted considerable study to the street railway system and to the system of city government, which he says he found extremely interesting. Regarding the present condition of the street railway system an immediate change is necessary, and, while his sympathies naturally make him favor municipal ownership, he sees obstacles in the way: namely, the unsatisfactory state of the general franchises; the fact that the system is likely to be the largest in the world, and an independent system would only add to the confusion; the present equipment is so poor that it would have to be thrown into the scrap-heap. Of more weight, however, than any of these considerations, is Mr. Dalrymple's opinion that from his knowledge and experience of what it means to operate a street railway system, the municipalities of the United States are not yet ready to successfully undertake this work.

### Dunne to Dalrymple

The atmosphere hitherto obscuring the Chicago street railway situation having somewhat cleared, owing to the decision of the Illinois Supreme Court, which we noted in our issue of March 21, Mayor Dunne is in a better position to reply to Manager Dalrymple. He adheres to the original premise, that the city of Chicago had, by electing him, decided to municipalize its railways; that if he had desired advice on that point, he would have applied to the Lord Provost. At any rate, Mayor Dunne finds the report interesting and valuable so far as it relates to the management of a municipal railway. No one questions Mr. Dalrymple's skill and experience as a traction employee and manager, but when he deals with questions of public policy his views are of the same value as those of any other stranger who spends a few days in this country. Mayor Dunne resents the imputation that the citizens of his city are not just as honest and as intelligent and capable of managing their public utilities as the citizens of Glasgow or any other European city.

It has occurred to us in our observations abroad that the immunity from personal attacks that foreign officials enjoy is perhaps due to the severity with which the libel laws are enforced; in America, on the contrary, wholesale condemnation of those in power is considered by many the highroad to personal preferment alike.

### Combined Trolley and Steam Traction

That steam and trolley service may operate together in harmony has been demonstrated on the Long Island Railroad, where for several years trolley cars have been run between Hammel's and Far Rockaway over the tracks of the steam road. President Mellen, of the New Haven railroad, is anxious to electrify all the steam tracks in the vicinity of Hartford in order to determine, on a large scale, whether steam and electric traction may not be worked in common. Instead of running suburban trains to the station, with all the delays incident to progress through crowded freight yards, the object is to connect at convenient points with street railway tracks and make a circuit of the principal streets—to the advantage of shoppers and the railroad and honor.

### An Auditor's Model Report

A model monthly balance sheet is that prepared by City Auditor Page, of Fitchburg, Mass., for the benefit of the members of the city government. It appears in the daily papers about the same time every month and gives the taxpayers an idea as to where their money is being expended. The sheet contains 42 different accounts and shows in a clear form the sum appropriated to the fund, the balance from the previous year and the amount received. On the same line are given the amount expended, the unexpended balance and, if any, the amounts over-

drawn. At the end of the fiscal year a statement is issued that shows the closing up of the accounts.

We do not remember ever having seen an auditor's statement so detailed and so compact. It would be an excellent idea for cities to issue all reports like the cost accounts of large contracting firms, stating detailed expense per unit of service performed.

### Freight by Trolley

THE passage of the Trolley Freight bill by the New Jersey Assembly has created considerable apprehension among the urban population of that State. In the opinion of the farmers the bill is a most excellent one, allowing them to ship their produce to market at a minimum expense. Even among the farmers there may be objectors, for the farmer who now appears glad of the opportunity to spend most of the day in carrying one can of milk to the station will hereafter have to work. However successfully such legislation has operated in the West in getting grain to the elevator, it is questionable of how much worth it would be in New Jersey, where lack of terminal privileges and facilities in the cities may deprive it of value. The urban view seems to be that when the trolley companies have properly solved the problem of passenger transportation there will then be ample time for them to consider the grant of freight-carrying rights.

### New York and Rapid Transit

THE City Club of New York has issued a statement fully explaining its attitude in regard to the Elsberg Rapid Transit bill, a matter referred to on page 177 of our issue of February 21. As then stated, the view is held in some quarters that the Rapid Transit Commission should be compelled, by the new law, to make separate contracts for construction and operation respectively, while others urge the retention of the system under which the existing subway was built, the work of construction and operation being let as parts of one contract.

The City Club takes up a middle course between these two positions, and in the statement now referred to alludes to the conflict of opinion, between eminent counsel, as to whether the Elsberg bill, in its present form, is a mandatory or a permissive measure. The City Club regards the subject as of too great importance to justify any doubt on this point and has given its support to a substitute bill originally drawn "for the sole purpose of making it perfectly clear and apparent that the power to separate contracts for construction and operation was permissive and not mandatory." The statement proceeds as follows:

"What the City Club is seeking to accomplish is to make absolutely clear and plain, in whatever Rapid Transit legislation is passed at this session, that the powers of the Rapid Transit Commission with regard to the letting of contracts shall be permissive and not mandatory; that the principle of home rule shall be observed, and that the hands of the local authorities shall not be tied so that they cannot make the best terms for the city's interests. The provisions in the so-called substitute bill relating to the length of term of the contracts are not ones which the Trustees of the Club are especially solicitous about. They are, however, determined that, so far as the Club is concerned, it will advocate, with all its power, the enactment of legislation which will give the local authorities the power to separate contracts for construction and operation, and, if necessary, to municipally operate the road themselves, and that such power shall be stated in language about whose meaning there can be no doubt."

The Club disclaims any interest in pushing the substitute bill, provided the Elsberg bill is so amended as to make its permissive character clear beyond all doubt, and refutes the assertion that the Club is divided in this matter, only two members, out of 1,284, having taken exception to the Club's action.

### Value of Franchises

THE Kansas City *Star* recently directed attention to the automatic increase in the value of franchises, due to the growth of population alone. While the statements made had special reference to that city, their bearing upon the general problem is too obvious to require enforcement at our hands. "An increase of 1,000 in the population of Kansas City," says the *Star,* "means an increase of $12,000 a year in the Metropolitan Street Railway Company's receipts." The gross earnings of the company are stated to average $12 a year for every man, woman and child of the city's population, and if that figure be applied to a prospective population of half a million the gross earnings would amount to $6,000,000 a year. Our contemporary points out, too, that "as the outside territory builds more compactly the mileage does not need to increase to correspond. It won't increase as fast as the receipts increase. The company may double the number of cars it uses without greatly increasing the mileage. Lines that are not extended show yearly increase in traffic."

### Let Albany Flourish

THIS is evidently the motto of the Chamber of Commerce which devotes so large a share of public-spirited attention to the improvement of this important New York City. Its report for 1905 contains many evidences of continued activity, not merely in taking advantage of occasion, but in looking ahead and formulating opinions in regard to prospective opportunities. Among the subjects treated in the report are the removal of overhead wires, the abolition of toll-gates (surely an anachronism in this year of grace), improved methods of handling and storing coal, clean streets, street car transfers and unsightly advertisements. Excursions from other cities have been encouraged, and information has been supplied to manufacturers and others, the number of letters written in the office during the year being over 21,000, not including circulars and pamphlets sent out. Work suggested for the future includes the encouragement of efforts to secure the building of an intercepting screen along the river front.

# CURRENT LITERATURE ON MUNICIPAL TOPICS

### Fire Tests of Building Stones

*Bulletin No. 100 of the New York State Museum,* (Albany, February, 1906) consists of a treatise by W. E. McCourt dealing with fire tests to which certain New York building stones were subjected under the initiation and superintendence of Prof. Heinrich Ries, Mr. McCourt being responsible for their conduct in detail. After a brief reference to the investigations of others on the effect of heat on building stones, the author describes his methods. Six samples of stone, in three-inch cubes, were subjected to different tests, two being heated to a temperature of 550° C., two to 850° C., and one of each pair being cooled rapidly; of the other two samples, exposed to a direct flame, one was cooled with water. None of the samples stood the test without injury, and, so far as the tests show, a building made of any of them might pass through a fire safely. In a general way, the harder and more compact the stone the better it stood the tests, sandstone standing best, and gneiss failing signally. The numerous illustrations are an essential part of a volume which forms a valuable contribution to the literature of the subject.

### School Ventilation Problem

*Gesundheits-Ingenieur* (Munich, March 3) in a lengthy article on "The School Ventilation Problem in the Light of Modern Research," refers to the proved practicability, as demonstrated in America, of automatically maintaining a constant room temperature. What is described as the obligatory system, in the United States, of changing the air eight times an hour, is regarded as being of doubtful practicability in Germany, where a change five times per hour leads to complaints of draughts. "It may be said, of course, that Americans are more hardened against draughts than we. Possibly the very great deficiency in air saturation which prevails in the United States has something to do with this feature, the always dry skin surface being more easily capable of enduring draught without feeling it. A damp skin, however, becomes more sensitive to continuous and prolonged cooling action."

### "Benefits of Pavements"

*Brick* (Chicago, March 1) has an article, in Prof. Ira O. Baker's lucid and informative style, in which that authority discusses the "Benefits of Pavements," being a paper read before the Illinois Clayworkers' Association in January last. On the other side of the account—disadvantages—Professor Baker gives prominence to the changed conditions produced by the transfer of traffic to previously quiet streets when the latter are improved relatively to their neighbors. "Failure to recognize the condition," he observes, "has caused confusion and increased the difficulties of securing the pavement."

### Concrete in Europe

*Concrete and Constructional Engineering,* a new bi-monthly candidate for public favor, is published at 57 Moorgate Street, London, England, at the subscription price of 7s 6d ($1.85) per annum. The spring number (March) gives abundant promise of a useful career, not merely in its introductory "Announcement," but in the character of the articles and illustrations. Among these contributions may be noticed "Steel Skeleton Construction and the London Building Act," by W. Noble Twelvetrees, M.I. Mech.E., in which the conservatism of that document is shown by its enforcing, for steel reinforced structures—the same wall thickness as in ordinary masonry work. The articles generally, including that just named, indicate rapid European progress in the adoption of modern methods in the application of concrete.

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### Standards of Illiteracy

THE attention of education authorities and reformers is directed to a report issued at Albany, N. Y., in which State Commissioner of Education Andrew S. Draper, LL.D., reviews the question of illiteracy in the Empire State. The report is not merely of interest from the local point of view, but contains data which might well serve as a basis for the records of other States. It is pointed out that the State of New York occupies a special position in this respect, owing to the exceptional influx of immigrants received—a factor to be taken into account in any endeavor to appraise the value of the State's educational activities. These, it would appear, are largely neutralized by the steady stream of aliens, mostly uneducated, which exerts such an influence on the composition of the aggregate population. Thus, while the illiterates were 7.1 per cent. of the population in 1870 and 5.5 per cent. in 1880, 1890 and 1900—children under ten being excluded throughout—the illiterates in the United States were 20 per cent. in 1870, 17 per cent. in 1880, 13.3 per cent. in 1890 and 10.7 per cent. in 1890. In other words, New York State has not reduced the percentage of her illiteracy in the last thirty years, although a material reduction has been effected in the country at large.

While the larger percentage of illiterates is found among the recent immigrants, these forming 81 per cent. of the whole number, there is, on the other hand, a greater appreciation of school privileges in this class. This is pointed to by the fact that the percentage of illiterates born in this country of foreign-born parents (5.7 per cent.) is much lower than that (9.2 per cent.) of illiterate children of native-born parents. The illiterate children of native parents are practically all in the rural districts.

# REVIEWS OF IMPORTANT BOOKS

*The Bitter Cry of the Children.* By JOHN SPARGO, with an introduction by ROBERT HUNTER. New York: The Macmillan Company, 1906. Cloth, 5½ by 8 inches, 337 pages. Price, $1.50 net.

The inclusion of the present volume among those calling for notice in these pages gives less occasion for question the more thoroughly its contents are studied, for many of the conditions revealed by its author are, if not the direct result of civic neglect, at least capable of amelioration by well-timed municipal intervention. At a time when the disgraceful condition of the Capital's slums is being laid bare by iconoclastic hands—indifferent to what may be said about disturbing the public conscience in this respect—the ordinary obligations of city authorities towards those unable to voice their own grievances need to be enforced by every available means. It will be a new sensation to many Americans to read of physical degeneracy among the juvenile workers in mills and factories—not of Lancashire or Saxony, but of their own more favored land. Such chapters as "The Blighting of the Babies," and "The Working Child" are wholesome reading in a double sense; they disclose, on the one hand, the existence of dangers known or suspected by few, and, on the other, may serve to diminish the pharisaical tendency, easily explained if less easily justified, prevalent among a people to whom these things come as an unwelcome revelation.

This is not a volume to be taken to a pink tea, to be dipped into or read from for the edification of a mixed or juvenile company. The author does not call a spade a horticultural implement, either when discussing the nurture of children or the propagation of the social evil, and although these things may appear to have only a slight direct connection with workers' conditions, it is none the less true that the chapters dealing with them are among the best and most apposite in the book. The illustrations are the weak point in its production, but, even so, they serve to accentuate a story which it were well had it been impossible to write in these twentieth century days.

*Ventilation of Buildings.* By WILLIAM G. SNOW, S.B., M. Am. Soc. Mech. Engin., and THOMAS NOLAN, A.M., M. S., F. Am. Inst. Arch. New York: D. Van Nostrand Company, 23 Murray street.—4 by 6 inches, cloth, 83 pages. Price, 50 cents.

In the form made familiar by the Van Nostrand Science Series this latest addition to it gives the leading data in regard to ventilation requirements, and reviews the various systems by which these can be met. In particular, the distinction between the plenum and the vacuum system is carefully enunciated, a suggested combination of the two being, in the author's opinion, best calculated to obviate certain disadvantages of each. The relation of ventilation to heating is fully discussed, in which connection the relative merits of upward and downward currents are set forth at length. The example of the German House of Parliament is cited to show that, in order to reconcile conflicting duties, it may be necessary to provide for the intermittent adoption of both methods. An important and too often neglected point—the necessity of maintaining a proper degree of humidity in artificially warmed rooms—is properly insisted upon.

*Jahrbuch für Gesetzgebung, Verwaltung und Volkswirtschaft im Deutschen Reich.* Thirtieth year, Vol. I. —Price M. 9.60 ($1.55).

Readers of German will be interested in knowing of the publication of this volume by Messrs. Duncker and Humblot, of Leipsic. Among the articles contained in its 500 pages we may mention those on the simplification of workmen's insurance, the regulation of pawnshops in Germany, and the revisionist movement in the German social democracy. A large part of the book is devoted to a review of international literature, covering the ground generally represented by the title. Students of civic problems who do not confine their attentions to American conditions and sources of information will find a mine of suggestion in the articles and reviews, the latter serving as an admirable index to modern thought.

*Crematoria in Great Britain and Abroad.* By ALBERT C. FREEMAN. London: The St. Bride's Press, Ltd., 24 Bride Lane, E. C. The price of this book, which we were unable to note in our review, page 234, March 7, is five shillings net. Our present issue contains an illustrated article by the author, dealing with this subject.

*Heat and Light from Municipal and Other Waste.* By JOSEPH G. BRANCH, M. Am. Soc. M. E.: Wm. H. O'Brien Printing and Publishing Co., St. Louis, Mo. Cloth, 6x8 inches, 305 pages.

The author reviews the garbage question at length, giving statistics from American and foreign cities. His own ideas are carried out in an incinerator of his own invention. The volume contains information useful to practical engineers.

A MISPRINT.—In our review of *The Law Relating to Oil and Gas* (March 7, page 233), the name of the author was inadvertently printed W. W. Thomson; it should be W. W. Thornton.

# DESIGN OF CREMATORIA AND COLUMBARIA.

## Architectural Beauty of Buildings Should Contrast with Unpleasant Cemetery Surroundings—Conditions in Troy and Cincinnati, San Francisco and Liverpool—Paris and Elsewhere.

By ALBERT C. FREEMAN, U. S A.*

THE subject of Cremation, which is receiving considerable attention in England and the United States, is one of considerable interest to public bodies. It may reasonably be expected that, before many years have passed, buildings for cremation, with columbaria for the reception of urns, will be found in many cities which rely, at present, exclusively upon the earth-to-earth system.

The burning of human remains is by no means a new custom, but the methods adopted to-day differ materially from those of the ancient world; we erect magnificent buildings and incinerate the dead with the assistance of gas, oil or coke in furnaces designed for this particular purpose, whereas in the time of the Romans the bodies were placed upon the pyre or roga, anointed with oil and burned in the open. History teaches us that cremation was the general custom in India from the most remote age. The Etruscans disposed of their dead by burning, adopting the practice from the Greeks. The Romans at all times attached great importance to the burning of the dead: Shakespeare, in one of his plays, gives a description of the funeral of Julius Caesar, murdered B. C. 44:—

> "We'll burn his body in the holy place
> And with the brands fire the traitors' houses."

There is no doubt that the practice of cremation in modern Europe was at first stopped, and has since been held in check by the Christian doctrine of the resurrection of the body; partly also by the notion that the body is redeemed and purified.

The first crematorium to be erected in England was at Woking, in 1879, but as the Home Office (Secretary of State for the Home Department) prevented its utilization it lay idle for many years, and not until the year 1885 was it put into practical use; since then crematoria have been erected in Manchester, Hull, Liverpool, Birmingham, Darlington, Leicester, Golder's Green, Bradford, Headingley, Ilford and Glasgow. There are four crematoria to be found in France, nine in Germany, four in Switzerland, one in Denmark, two in Sweden, one in Australia, one in Canada, twenty-six in Italy and twenty-five in operation in the United States of America.

"One need not be frightful when one's dead," said Pope's Narcissa, as with her last words she directed her attendants "to give this cheek a little red." In any case, neither the memorials of the departed nor the buildings erected for the disposal of human remains need be frightful, although some of those already erected, both in England and in the United States, are far from being works of art or architectural design.

There is plenty of ugliness and vulgarity everywhere in the existing cemeteries; we find little that is interesting or of architectural beauty. When walking through a cemetery or churchyard we find crude examples of sarcophagi, then a slab of stone raised upon columns above another slab forming the base; or a broken column, cut out of all proportions, resting upon a base with mouldings clumsy in detail; everywhere is the vista of square and round headstones leaning in all directions. Each of these designs we see is neither better nor worse than the rest, for the simple reason that all are as bad as they can be. In discussing the design of crematoria and columbaria, we should keep in view the hideous sights of the present cemeteries, and in designing the urn cemeteries of the future take a lesson from the past and produce monuments which will be a credit to the architectural profession.

By reason of the advance and multiplication of crematoria and columbaria, the subject of planning and design of these buildings may be said to ocupy a place in architectural practice as important as any other; it occupies, besides, almost a unique position in the return to one of the most ancient customs.

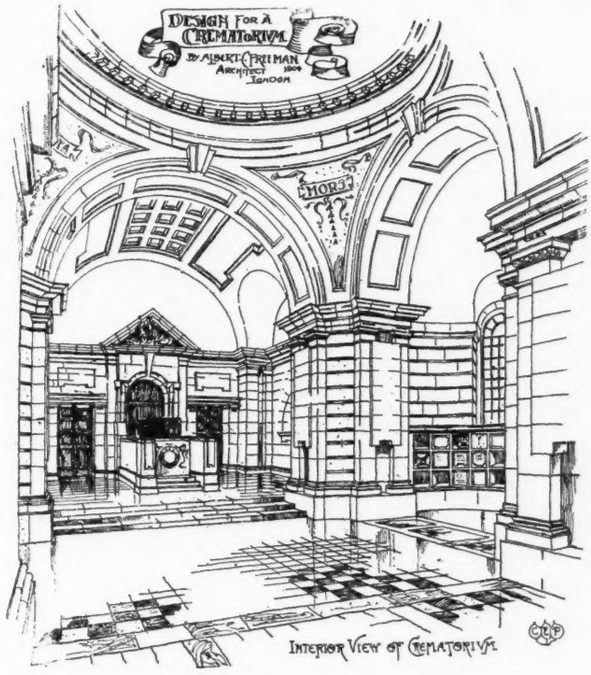
There is no doubt that design and surroundings exercise a great influence upon the minds of the general public; it is not to be supposed that, by the mere addition of a cremating chamber to an existing cemetery chapel, any headway would be made towards converting those preju-

THE CREMATORIUM, HEIDELBERG, GERMANY.

* Author of "Crematoria in Great Britain and Abroad," noted elsewhere in this issue.

diced to the reform. It is therefore the duty of an architect to make both the exterior and the interior of his buildings such as will not cause any feeling of depression. They should be treated with a scheme of color that will appear cheering in winter, while suggestive of coolness in summer, and also be in harmony with the requirements for which they are erected.

In the general arrangement of crematoria, it is found that the principles of planning vary with the many coun-




A CREMATORIUM DESIGN, BY THE AUTHOR.

tries in which they are to be found; the following schedule gives the sizes of the chapels and incinerating chambers of the principal buildings in England.

| Building. | Chapel. | Incinerating Chamber. |
|---|---|---|
| Golder's Green ..... | 70′ 0″ × 25′ 0″ | 62′ 0″ × 40′ 0″ |
| Manchester ..... | 50′ 0″ × 25′ 0″ | |
| Leicester ..... | 43′ 0″ × 24′ 0″ | 43′ 0″ × 23′ 0″ |
| Hull ..... | 24′ 0″ × 24′ 0″ | 24′ 0″ × 20′ 0″ |
| Birmingham ..... | 50′ 0″ × 25′ 0″ | 48′ 0″ × 25′ 0″ |
| Ilford ..... | 25′ 0″ × 24′ 0″ | 37′ 0″ × 30′ 0″ |
| Headingley ..... | Existing | 34′ 0″ × 20′ 0″ |
| Sheffield ..... | " | 36′ 0″ × 36′ 0″ |

The crematorium at Manchester comprises a large hall, with catafalque and organ; also, waiting-room, vestry, and incinerating chamber, the exterior being more satisfactory than the interior. Receptacles are provided in the walls inside the hall, and also in the external walls, for the deposit of urns. The exterior columbaria are protected from the weather by colonnades.

At Liverpool, provision is made of a chapel and incinerating chamber on the ground floor. Here the cremating chamber is divided into two apartments, one being an ante-chamber, the other the cremating chamber with the furnace. This is not a plan I should advise to be followed, as it necessitates considerable labor in the transport of the coffin from the chapel into the furnace. A small columbarium is arranged under the chapel, with access from the same; it has three well-lighted corridors in which are arranged a series of 486 niches for the reception of urns, some of a size suitable for five urns and others intended to receive three.

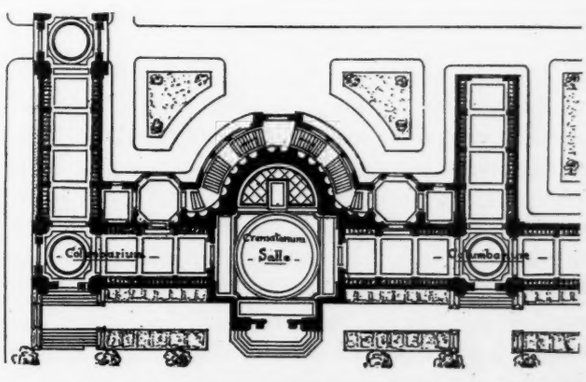
The crematoria at Hull and Ilford are very similar in plan, excepting that one has provision for one furnace, while the other has accommodation for two. The catafalque in both buildings is of iron, draped with purple velvet, standing upon stone landings and steps.

The crematorium at Leicester is built of brick with stone dressings in a late Gothic style. It includes two chapels, about 24 ft. x 43 ft. each, and having a chancel at the rear, measuring 17 ft. x 17 ft. 6 ins. One is intended for inhumation service; the other, which is for cremation, is fitted with an oak catafalque. At the rear of the chapel is the incinerating chamber, which has provision for two furnaces, only one of which is fixed at the present time. At the front and the side of each building are cloisters, in which it is intended at some future date to form niches for urns; they are divided by a carriageway, above which rises a tower. At the rear of the chapels are waiting-rooms, bier-shed and mortuary.

The crematorium at Paris comprises a large hall or chapel, with three small halls at the rear, each fitted with a furnace concealed by masonry in the form of a sarcophagus. The crypt under the chapel is fitted as a columbarium. A scheme for a future columbarium, consisting of a series of arcades running along the walls of the cemetery, has been prepared by M. Formege, Architect of the city.

A scheme for a columbarium and crematorium of some magnitude has been prepared for Geneva. Up to the present, the only portion completed is that of the crematorium; the building, which is in the Byzantine style, has on the ground floor a large hall, in which stands the catafalque. It is the custom here to place the coffin under the catafalque, upon a lift which is automatically lowered to the basement, in which stands the cremating furnace.

Milan crematorium is a fine example of Doric architecture. It is constructed of white marble and forms a very imposing structure. Here, the funeral service is conducted in the entrance hall, after which the coffin is removed to the cremating-room, where the attendants




THE CREMATORIUM, GENEVA, SWITZERLAND, SHOWING COMPLETED PORTION.

place the body upon an iron shell supported upon a carriage, running on rails laid parallel to the cremating furnace. The carriage is brought up to the front of the chamber, into which the shell is quickly placed, the carriage being then withdrawn. At either end of the building columbaria are provided, while in the crypts below are receptacles for the ashes of the poor classes.

One other of the many excellent examples to be found in Italy is the crematorium of Turin. This building, which is in the Doric order, was erected from the design of the late Pompo Marini, architect. The principal entrance is approached from the Avenue of Circumvallation. A garden is skirted by open colonnades, in the rear of which niches are provided for urns. At the intersection of the colonnades is a small shrine or chapel, giving access to the cremating hall. Provision is made for upwards of 2,370 niches, exclusive of those in the small shrines or chapels.

The chapel or hall is architecturally designed, with marble columns on each side, with the cremating chamber at the end, the entrance to the furnace being treated with two sculptured figures standing upon pedestals, as in the act of guarding something sacred.

The crematoria in the United States vary much in the planning and design. Here are to be found one or two buildings rich in design, while the majority may be said to be very common-place. The Earl Crematorium, Troy, N. Y., may be said to be one of the best examples; it is designed in the Romanesque style, and comprises a chapel 40 ft. x 26 ft. with a chapel 26 ft. x 16 ft. The chapel is artistically decorated, money not having been spared in this respect. The chancel has a mosaic floor of an elaborate design; the catafalque is of green Belgian onyx, having at the head three stained-glass windows, containing centrally a figure of Christ, with angels on either side. Adjoining the chapel is a reception room 24 ft. x 20 ft.; here the walls are faced with Siena marble blocks in 12 inch courses, with a carved moulded cornice of the same material. The doors and windows have arches of pink African marble; they spring from green Belgian onyx marble columns, 5 ft. 9 ins. high and 11 ins. in diameter. Their bases are of carved green Japanese marble and the caps of Siena marble carved in many designs. A stained-glass ceiling light is formed 23 ft. above the floor, supported by vaulted mosaic panels of colored marble, rising 7 ft. above the cornice, displaying a number of life-size forms, surrounded by Eastern birds and vegetation.

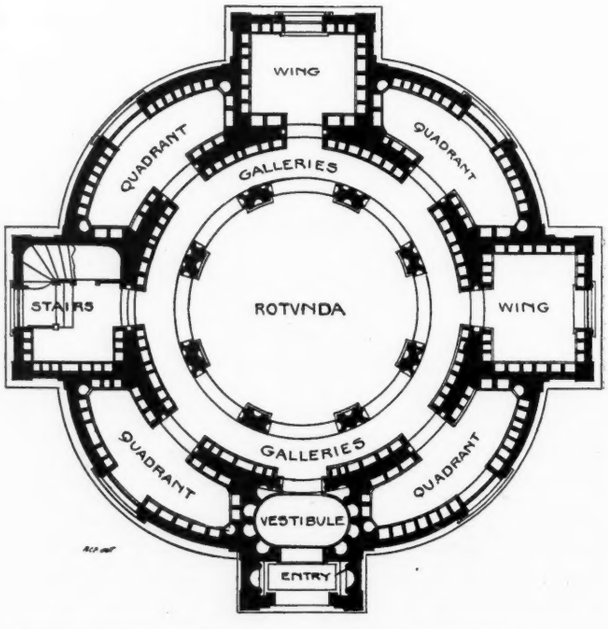
The Cincinnati Crematorium, completed in November, 1888, at a cost of $40,000, is octagonal in plan and designed in the composite style of architecture. On the first floor are a preparing-room, columbarium, and cremating chamber; above these, on the second floor, is the chapel, which has seating accommodation for 150 persons and is provided with an appliance for lowering the coffin to the incinerating room. In the chapel, 150 receptacles are provided for the storage of urns; they are constructed of hammered and bronzed iron work and the floor of each receptacle is fitted with a lock, of which no facsimile is to be found in the room.

The columbarium and crematorium in the Odd Fellows' Cemetery, San Francisco, may be said to be the finest examples in the world. Here the chapel in the crematorium has seating capacity for 140 persons, and will, with standing room, accommodate 200. Directly underneath the chapel are reception-room, preparing-room, incinerating chamber and temporary urn-room. The coffin is carried into the reception-room, and if there is no funeral service it is conveyed directly to the incinerating chamber; when a service is performed, the coffin is placed upon an elevator and raised to the chapel above, and afterwards lowered to the reception-room. It is then taken to the incinerating chamber, placed upon a steel carriage, and quickly placed in the retort. Connected directly with the chapel is a gallery, running round three sides of the cremating chamber, where persons may witness the work of introducing the coffin and remains into the furnace.

The columbarium is a separate building, distant about 650 feet from the crematorium; it is designed in the form of a Greek cross. Provision is made for upwards of 1,700 niches, varying in capacity from two to twenty urns, on the ground floor; the first floor is a duplicate of the ground floor, with the exception of the quadrants, which are lighted from the top instead of the sides, and contains 1,600 niches. The second floor is similar to the galleries of the ground floor, excepting that the wings and quadrants are omitted, and it contains upwards of 700 niches, the capacity of which varies from one to ten urns. The whole of the niches are closed and dust-proof.

### The Design of Crematoria

In the planning of a crematorium, the following accommodation may be taken as necessary. A chapel having a minimum floor area of 1,200 feet. At the rear should stand the catafalque, so arranged as to allow of the coffin passing directly to the incinerating chamber. The




COLUMBARIUM, ODD FELLOWS' CEMETERY, SAN FRANCISCO, CAL.

catafalque in general use in England is 12 ft. long, 3 ft. 8 ins. wide and 4 ft. high. The top is fitted with a steel plate and apparatus worked by means of an endless chain, which conveys the coffin from the catafalque into the incinerating chamber. In designing the catafalque there is ample scope for the use of marble, mosaic, etc., and I venture to think that those who have already had the privilege of designing buildings of this character in England have scarcely taken sufficient advantage of the opportunities offered them in this direction.

The incinerating chamber should be planned at the rear of the chapel and have a minimum width of 20 ft., with a length of 25 ft. for a single furnace. When two or more are provided, the superficial area will be increased in proportion.

When it is intended to use a "Simons'" furnace, a basement of 6 ft. 6 ins. high is required to receive the lower portion of the apparatus; it is also advisable to form an opening in the floor, clear of the furnace, to relieve the structure from the effects of expansion and contraction.

In every case the furnace should stand 10 ft. from the wall, dividing the chapel from the incinerating chamber; this allows for the rails upon which the carriage runs, between the catafalque and the furnace.

The chimney, which should in all cases be clothed with a tower or other similar treatment, requires a minimum internal measurement, at the base, of 2 sq. ft., and should be carried to a height of at least 60 ft. It is necessary to provide an opening in the base of the chimney shaft for the purpose of lighting a pilot fire to cause a draught and start the furnace. This opening should be about 2 ft. wide and 3 ft. high, fitted with an iron frame and door.

In the design of columbaria, there are more opportunities of originality in the planning than any other building I can think of. I would suggest when planning a columbarium, avoid square buildings; they are never satisfactory. The better form of plan of a structure of this character is that having a large hall, with urn temples or apartments branch from it; with this arrrangement the hall will provide accommodation for the storage of the urns and ashes of those of limited means, while those in a position to pay larger fees will find better accommodations in the urn temples. The latebræ, or niches, should be constructed to hold from one to five urns in a single compartment. The urn in general use in Great Britain is what is known as the "Box" shape; it measures 16 ins. by 8 ins. and is 8 ins. high. The "Vase" shape urn is occasionally used; this measures about 12 ins. diameter and 18 ins. high. The front of the urn receptacles should be closed by marble or glass tablets, preferably the latter, and held in position by copper or iron fittings. In the construction of these niches I think materials such as terra-cotta partition blocks, expanded metal and other kinds of partition blocks could be easily adapted. They would be inexpensive and occupy little space.

# MUNICIPALITIES IN CONVENTION

## Varied Subjects Considered by Municipal League at Grand Rapids—Election of Officers—Eighth Annual Session

THE eighth annual convention of the League of Michigan Municipalities, held at Grand Rapids in February, was a gratifying success from every point of view. More than one hundred and fifty delegates registered from thirty-six cities and villages, including the Mayors of twenty of the most important cities in Michigan. The evening meetings were attended by several hundred citizens of Grand Rapids.

Most attention was attracted by the address of Mayor Dunne, of Chicago, on the subject of municipal ownership, which he discussed both in its general aspects and with special reference to the situation in Chicago. Mayor W. R. Taylor, of Kalamazoo, spoke on the street railway question, with special reference to the problems of interurban lines, as affecting Michigan cities, and favored municipal ownership of the tracks as the best solution. Mayor George P. Codd, of Detroit, considered the changes in the State constitution needed to confer adequate powers on cities in dealing with street railway and other problems. And H. T. Heald, of the State Legislature, showed the necessity for a general revision of the State constitution in regard to municipal affairs.

Resolutions adopted by the League endorsed the proposal for a constitutional convention, to be voted on in April, and called for changes in the State constitution to authorize municipal ownership when approved by popular vote in each locality, and to provide for home rule in making municipal charters.

More unusual for a meeting of city officials was the attention paid to the question of non-partisan municipal elections and the reform of political methods. In his address, Mayor Sweet, of Grand Rapids, the President of the League, favored non-partisanship in municipal government, so well exemplified in his own administration. Other speakers united in endorsing this position. Rev. Jenkin Lloyd Jones, of Chicago, in a stirring address on obstacles to municipal reform, roused the delegates to higher ethical standards in municipal work. And, as a result, the League unanimously adopted resolutions endorsing the principle of non-partisan municipal government, and providing for a committee to investigate the workings of this method in Europe and America.

Officers for the next year were elected as follows: President, Alderman David E. Heineman, of Detroit; Vice-president, Mayor W. W. Todd, of Jackson; Secretary and Treasurer, Professor John A. Fairlie, of Ann Arbor; Assistant Secretary, A. H. Vanderberg, of Grand Rapids; Directors, Mayors J. C. Beckwith, of Marshall, F. C. Holmes, of Alpena, and A. J. Lacey, of Clare, Alderman Wm. G. Austin, of Kalamazoo, and Health Officer T. M. Koon, of Grand Rapids.

# CEMENT BLOCKS AND CONSTRUCTION WORK*

**Importance of a Comparatively New Industry—Stringent City Ordinances—Extensive Use of Material Depends Upon Care in Manufacture—Results of Various Tests**

City ordinances designed to control the use of cement blocks in building construction are frequently lacking in clearness and consistency and vary widely in their requirements. Some limit the use of concrete blocks to two-story buildings, and even these confine their use to residences, while others permit their use in six-story structures of various classes. Provisions of ordinances are sometimes so loosely drawn that a block made in strict compliance with one section would be condemned by the provisions of another section. Some ordinances require the use of materials which, owing to local conditions, are unduly expensive and reject other materials, equally good, which can be readily procured.

The object of city regulations—to obtain a high class of work—is approved by manufacturers of cement blocks and by builders; these complain, however, that sufficient latitude is not allowed to those skilful in the choice of their aggregates. To illustrate, consider the tests recorded by Dyckerhoff: a mixture of one part cement and four parts sand stood a compression test of 1,053 lbs. per square inch; a mixture of one part cement, four parts sand and eight parts broken stone stood a test of 1,205 lbs.; the second mixture contained one-third as much cement as the first, yet the concrete was 14 per cent. stronger; other tests, by the same authority, show that the addition of three parts of broken stone to a mixture of one part cement and two parts sand gave an increase of 622 lbs. (29 per cent.) crushing strength, while the addition of five parts of broken stone to a similar mortar gave an increase of 262 lbs. (12 per cent.).

Taking up in detail the requirements of a few principal cities, and referring to the ordinance in force in Philadelphia, the Author remarks that it is "by far the most comprehensive one that has come to my notice and the one most widely copied and most frequently cited"; it is faulty, however, in that it makes no distinction between the use of a mixture of one part cement and five parts sand, and that of one part cement, two parts sand, and three parts gravel or stone. Another part of the ordinance compels the use of one part cement, one and a-half parts sand and two and a-half parts gravel or broken stone, from which requirement no variation is permitted.

"The Philadelphia ordinance has fifteen sections devoted to rules and regulations for building structures of concrete blocks; fifteen other sections are required to define the methods and manner of making tests of such blocks, and five sections additional to the obtaining of licenses or authority to engage in the manufacture of this material in that city. In this elaborate enactment it is provided that in a building of but three stories in height, the first story shall have walls of a certain percentage of air space; while in a building six stories high, the third story, that must sustain three stories above, can have 8 per cent. more air space."

The section of the Chicago ordinance dealing with this subject, containing sixty-six words, contrasts with the Philadelphia ordinance of twenty-five hundred words, but resembles it in inconsistency. The Chicago Building Code is an elaborate affair, comprising the work of many experts, and is in most respects worthy of a city which does 80 million dollars worth of building construction in a year. Few words, however, are devoted to the consideration of concrete blocks and these practically prohibit their general use. Nevertheless, some buildings formed of hollow blocks have been erected under special permit from the City Council.

The Building Code of the city of Cleveland, Ohio, is considered by competent judges as the most perfect code yet devised. Very little space—fourteen lines—is given to specifications for concrete block construction—so little, in fact, that the Cleveland Code has been quoted as prohibiting the use of this material. But as interpreted by the proper authorities, it permits the use of concrete blocks and they have been used even in large public buildings.

With such glaring inconsistencies occurring in the carefully prepared building codes of large cities it is not strange that unnecessary restrictions exist in the regulations of smaller cities, such as those limiting the size of a block. In some instances regulations regarding the age of blocks when used are too lenient, while in others due allowance is not made in favor of blocks cured by steam under high pressure.

"The status of these regulations would be very different had the manufacturers of concrete blocks, in all or a majority of cases, made a really good block. The fact is, the average output has been so poor in quality that those in authority in the larger cities have been compelled, in self protection, to try to make regulations so stringent that inferior material and workmanship would not comply with their requirements. In this attempt, not having exact knowledge of the subject, they have been led into many errors, and conditions have been named that are unwarranted by any just view of this question.

"The truth is, the importance of this subject has not been grasped. Those of us that have given the matter some thought have failed to comprehend the needs and requirements of a business that has sprung into being and attained such proportions in so short a time. The experiments now being made by the committees of the different organizations will aid, materially, in determining what is right and fair to exact by those in authority in

* Abstract of paper read before the National Association of Cement Users' Convention, at Milwaukee, Wis., by W. J. Scoutt, Chicago.

our City Council, and what standard must be conformed to by the manufacture of concrete blocks of whatever make or pattern. When it is known what is a right and just standard, to which all concrete blocks must conform to permit of their use, the writer believes that their use cannot be restricted by ordinance in any city so long as they comply with safe practice. This material is suitable for use in buildings; it is the best material in many respects now in use, and the people of every community are entitled to its use. Whether they will generally adopt it and apply it to new uses will depend upon the integrity of the makers of the blocks and the care exercised in properly placing them in the walls, to the end that beauty, as well as strength, be secured.

"The standard that must be adopted cannot be one that restricts the use of blocks of a certain age, nor made of a certain proportion of aggregates, without reference to what the aggregates consist of, but it must relate to the quality of the product. In brick work no attempt is made to say that a brick shall be made of one certain kind of clay and not of another nor of clay at all; nor out of shale and clay, or even of sand. The brick requirement is one of strength and compactness; it should be so of concrete.

"Legislation must provide that no Building Commissioner or other person shall have the power to arbitrarily decide, without tests, whether a block may or may not be used. Nor can any stated dimension or form of block be adopted. The standard must be one of quality."

## GRAND RAPIDS GARBAGE PROBLEM

### Commission Submits Report After a Year's Investigation—Various Methods of Disposal Treated.

FREQUENT reference has been made in these pages, within the last few months, to the garbage problem under consideration at Grand Rapids, Mich. What appears to be the closing stage has at length been reached, the Commission which has had the matter in hand for a year having presented a final report. This takes the form of discussing the only two bids remaining for review. These are alternative bids made by Alvah W. Brown and George P. Dowling jointly, under one of which they would collect and dispose of all garbage and household refuse in return for a weekly payment of 3½ cents for each family, restaurant, boarding house, hospital, market, bakery or other establishment, the builders to have the exclusive use of the present garbage burner for disposing of the collected material. The alternative bid contemplates the collection of all garbage by the city, the bidders in that case to receive 40 cents per ton for its disposal.

Commenting on these offers, the Commission points out that while 3½ cents per week, or $1.82 per year per family, looks cheap at first sight, it is really in excess of what it costs the average American city for this service, this being "less than 20 cents per capita," while the bid works out at 22 cents. Cleveland is quoted at 15 cents, Toledo, 12 cents, Minneapolis, 16 cents, St. Paul, 10 cents, and Providence, 15 cents. Legal difficulties also stand in the way of the demand that the Board of Health turn over the existing garbage burner to the bidders. These, it is suggested by the latter, could be obviated by the city hiring them, at a dollar a year, to operate the burner, but the Commission discountenances this as a subterfuge to evade what is expressly prohibited by the city charter. On these and other grounds the rejection of this offer is recommended, the Commission recording the opinion that the city can collect its refuse cheaper and more satisfactorily than can be done by a private company. "In our opinion," the report proceeds, "the time has come when the city should prepare to collect its own garbage. The progressive American cities of to-day are demonstrating the fact that municipal ownership of this important utility is cheaper, more sanitary and more satisfactory. We believe that the people should own and operate this utility. . . . In our opinion $15,000 will purchase the necessary equipment [householders providing their own cans] and pay the cost of collecting for the first six months." An appended detailed estimate places the total for equipment, including twenty-three horses and ten garbage wagons, at $6,870 and the total operating expenses, for six months, at $8,130. A maximum of fifteen wagons is estimated as sufficient to handle the garbage business for several years, the extra cost for equipment being $3,150, with a total operating cost of $20,000 per annum. The population of Grand Rapids, as estimated by the Mayor, was 100,000 on January 1, and the report assumes a minimum of 12,000 families in estimating the cost per capita under the first bid.

The reduction method of disposal has been investigated by the Commission, with the result that its introduction is unequivocally discountenanced. "In Vienna, where the system of garbage reduction originated, it is not in use now. It is admitted that England is at least fifty years ahead of this country in the collection and disposal of garbage. There the reduction method has been tried and failed. At the present time there is not a reduction plant in operation in England, so far as we can learn, nor do we know of a city in Europe which is at present using the reduction method. The cities there have all turned away from the reduction process to the cremation, and they are also developing power from the waste heat to operate their utilities. In England alone there are 120 incinerating plants which supply, without extra cost, power for their lighting plants, waterworks and street railways." Cleveland is referred to as the only American city operating a municipal reduction plant. The Commission concludes by recommending the acceptance of a supplementary offer, by Messrs. Brown & Dowling, to dispose of the garbage and dead animals free, instead of charging 40 cents a ton, as in the earlier alternative bid. Under this method nothing but trash and combustible waste could reach the city burner, and there would be no expense for fuel.

# CIVIC PRIDE A VALUABLE ASSET

## National Municipal League Chairman Says Good Government Rests Upon Sound Ethics—Steady Improvement Noted—Business Men and Modern Methods to Obtain Results

Mr. Horace E. Deming, Chairman of the Executive Committee, National Municipal League, has issued an address from which the following is extracted: . . . . "In the long run, good government, like successful business, rests upon sound ethics. Honesty is the best policy. It is the only policy upon which government or business in a large sense can rest. Honesty integrates, upbuilds; honesty disintegrates, tears down. Honesty, sound morals, high ideals or conduct, make democratic government possible, and preserve and foster democracy. The 'Boss' as a means of facilitating public business exists because of a lack of civic pride. Civic pride would remove the need of an irresponsible political autocrat to get legitimate things done.

"I have heard corruption of a Board of aldermen justified because it was said that without purchasing the aldermen the franchise was impossible to get, and a great and needed public improvement would be lost. To what such a code of morals leads let St. Louis and other cities tell. After all, is illicit intercourse between business men and aldermen so much more reputable than between other law breakers and the police? The price may be higher; but how about the moral standard?

"Civic pride says, we will find some way to get public improvements without condoning or participating in fraud. Good government is a vital commercial asset, and a good democratic government is impossible without civic pride in the individual citizen, a deep appreciation of the dignity and responsibility of a democratic citizenship. For what is a realized democracy but a government of the people and for the people through agents and agencies selected by the people? This means a sturdy individualism, a government evolved from within, responsible and responsive to the governed, not a benevolent paternalism or an irresponsible autocracy imposed from without. It means a people supporting and energizing government, not a government supporting and controlling of the people. . . .

"It is the civic pride, the high civic ideal of the private citizen, the consciousness of the dignity and worth of democratic citizenship, the ennobling effect upon the man himself of the determined effort to make his standard of conduct accord with the lofty ideals of democratic citizenship that alone make possible a government of the people, by the people and for the people.

"Civic pride is more than an asset; it is the very soul of democratic citizenship. Without it one is not, and is not worthy to be, a citizen in the democracy. Civic pride makes one strive to be an affirmative positive force for civic betterment. It makes one appreciate that, if one wishes to have a government responsible to the governed, he must fit himself, as one of the governed, to enforce the responsibility. He must actually help to make the government what it should be, not content himself to be governed, complaining only when his pocket-nerve has neuralgia; nor to be satisfied to pour out criticism invective without qualifying for good citizenship by taking active part in constructive work to make the government better.

"No man, whether born or naturalized in the United States, is entitled to full credentials as a citizen until he has consciously done something that he believes will make for the improvement of the government of this country, his State, his city. We, too, have a mission to our children that their world shall be better for our building, as ours is the better for the generations that have preceded us.

"And this generation is making the world better. City government is far purer, more efficient, more economical, than in the seventies. Our elections are more honest, our laws more humane, the standard of business honor is higher, the abilities of our business men more conspicuous. We have grown not merely in wealth, but in civic virtue. If you feel pessimistic, study history. Nor need you go far back in time nor to other countries to receive encouragement. Familiarize yourself with the intimate details of the political, business and social life of your own country since 1850, and see how decade by decade the standard is ever higher. No, we need not despair of our country or of our city, nor lament the decadence of our day and generation. But what of you and me? That is the real, the vital question. What are we doing to make the world better? What are we doing to make this noble city of ours a yet nobler city? And if to these questions we must answer we have slight consciousness, or none at all, of honest personal effort, and we feel no shame, however large our bank account, or flourishing our business, civic pride is wanting from our assets.

"Is the day far distant when the aroused and intelligent patriotism of our business men will attack the problem of city government in the same clear-cut, acute constructive fashion that such men employ in any other important matter demanding attention outside their regular callings? When an experienced man builds a factory, he does not assume to be an architect or an engineer, but he knows how to find architects and engineers, and competent ones. When the product of his mill is poor in quality, he does not insist upon using the old machinery and the same superintendents and foolishly blame the bad product. He does not hesitate to invest in new machinery and to find better superintendents. There is no blind fetichism in the makeup of a wide awake, progressive business man. He honors his ancestors, but his ancestor-worship does not

make him prefer a horse car to a trolley car, a hod carrier to a hoisting engine, or refuse to install a telephone because his father employed the mail or messenger. Bigotry and blind adherence to tradition are short-lived in the business world. But in the business man's political attitude there is still a deal of bigotry and his thoughts on political matters are apt to be saturated with benumbing traditionalism. How else shall we explain the clinging to antiquated, cumbrous, expensive electoral methods that tend to put the actual conduct of the public affairs in the hands of a distinctly mediocre class of men as compared with men in positions of corresponding responsibility in the business world? Yet the conduct of government is far more difficult in itself, and its correct and efficient conduct far more vital to human progress than any private business whatsoever.

"The primary cause of municipal evils, the reason for their existence that overshadows all others in the ultimate analysis, is that our electoral and governmental systems are obstacles to efficient and high-class administration of the city's business. With all the progress we have made, with all the blessings we enjoy, we must recognize that, considered from the administrative side, our city governments and our political methods generally are inefficient and defective. Business men would not tolerate them in the conduct of their business.

"Why not make our electoral machinery simple, easily understood, adapted to express the real will of the real majority? There is no more important constructive political work pressing to be done than to bring about such a change in our electoral methods."

## THE SMOKE EVIL*

### Key to Its Successful Abatement—Sir Oliver Lodge Addresses a British Conference

NOTHING can be more insanitary in the long run than breathing the sun-obscuring atmosphere produced by the imperfect combustion of coal. Those who try to believe that smoke exerts a disinfecting and beneficial influence deceive themselves and, besides, who wants to live in the midst of a plague of disinfectant? However questionable the effect of tar, bitumen and ammonia may be, there is no doubt that sulphurous acid, readily oxidized into oil of vitriol, is a most noxious substance. For ridding the atmosphere of these impurities, electrification has been suggested. This, while effective, would probably be too expensive to try on a large scale. The simplest way to deal with the smoke problem is to avoid its production and, in cities, to insist upon combustion in such a way that no half-burned products shall escape.

The key to successful smoke abatement is to be found, then, in a proper understanding of the problems of combustion. Satisfactory combustion of coal as it is dug from the mines is an impossibility; its solid and gaseous constituents ought to be separated in the coal fields. The solid portion, coke, is valuable for smelting and manufacturing operations, the gaseous portion, after purification, can be easily transmitted to any distance and then burned in a scientific manner. By a process differing in some respects from ordinary distillation nearly all of the coal can be turned into gas, although it is a little more difficult to purify and has a somewhat lower fuel value. Any plan of producing gas is better than the present crude way of burning coal in a city; after being handled at least eight times before it reaches the fire, a great part of the fuel is discharged up the chimney and the cinders remaining have to be handled several times before they are disposed of. All these troublesome operations can be avoided by a system of pipes conveying gas from the producer near the coal mines and, with a more general use of gas, improvements would follow in the appliances for its use.

Proper means of securing complete combustion, either when burning gas or coal, are of the utmost importance and, as in the matter of putting fuel into the best shape for use, the best method is the most economical. The presence of cold surfaces near the flame is to be avoided. Flames cannot touch a cold surface, as ignition ceases and the unburned gas escapes. Many domestic grates and stoves contain too much iron. In some manufacturing processes the introduction of cold surfaces is easily avoided, as in firing pottery, and in the case of other furnaces dealing with incandescent material. In firing boilers, however, it seems impossible to prevent the loss of unconsumed gases owing to contact with cold surfaces. Hence the great economy of gas engines which, it is to be hoped, will gradually replace steam engines. Engineers are generally satisfied if the heat generated is absorbed by the boiler, though even this is never fully accomplished. The drop in temperature between furnace and boiler is responsible for the loss of about seventy per cent. of the fuel value. An adequate supply of air under the grates is also an important condition to complete combustion—otherwise the furnace acts as a gas retort and distills away the fuel. Automatic stokers are a great help in keeping grates free from clinkers and allowing a free passage of air, and they also supply a constant feed of fresh fuel in the right place and way. Probably no automatic stoker is superior to an intelligent fireman, but the stoker is not subject to fatigue.

Having considered the selection of fuel and complete combustion, the author considered the subject of utilization of heat in its relation to smoke prevention. The only way of conveying heat from a flame to a cool surface is by radiation. Accordingly, a luminous and somewhat smoky flame is necesssary inside a boiler, radiation occurring from the solid particles in the flame. Combustion may be completed by air introduced behind the boiler and before the smokestack. A better plan than this is to introduce a special solid material into the flame and keep it at a white heat, where it radiates heat, on the same principle as an ordinary gas mantle.

* Abstract of the Presidential Address by Sir Oliver Lodge, F. R. S., Principal of the University of Birmingham, at a Conference of the Royal Sanitary Institute of Great Britain with the Coal Smoke Abatement Society.

# ASPHALT COMPETITION

## The Struggle for Commercial Supremacy in Paving—Complicated Issues Involved—California and Trinidad Products

To decide upon the relative merits of competing materials is one of the difficult tasks which engineers must deal with, the difficulty being greatly increased by the conflicting claims and arguments of those engaged in promoting the sale of rival materials. To refuse to consider anything lacking long-established reputation restricts competition, increases cost and discourages advance and improvement, while the acceptance of new materials involves danger to reputation and durability of construction unless thorough and expensive tests are made.

Asphalt is one of the commodities about which several strenuous commercial wars have raged. The first of these was over the relative merits of European rock asphalt and the Trinidad product. The rock asphalt men claimed theirs to be a "natural" and Trinidad an "artificial" paving material. Both materials continue to be used in considerable quantities and the discussion is now almost forgotten. The next important asphalt controversy was over Trinidad "Lake" and Trinidad "Land" asphalt. Each was "best and the only genuine." Both remain in use and many believe that there is little difference between them.

In 1893, when asphalt was first brought from the Alcatraz deposit in California, the paving specifications of most important cities admitted only European rock asphalts and Trinidad for street paving. The Trinidad people did not welcome their new competitor. When the confusion of conflict had passed, Alcatraz asphalt was recognized as a high-class material and is now widely used.

The latest asphalt war is between those engaged in marketing Venezuela and Trinidad material on the one hand, and, on the other, those interested in asphalt obtained from refining the asphaltic oils of California. Those opposed to the latter material call it an "artificial," a "residual" product. The California asphalt men, in reply, point out that all asphalt originated from asphaltic oil and that all paving asphalt must be refined; therefore, the use of the terms "natural" and "artificial" are illogical at best. They also point to the report of Chief Engineer Nelson P. Lewis to Mayor McClellan, of New York, in which he says:

"It must be admitted that the earlier pavements of that company (Brooklyn Alcatraz Asphalt Company) in which they used a hard natural asphalt were inferior to those subsequently laid."

California asphalt is used by many important cities and some of the most successful paving companies; it would seem that history is repeating itself in this field. The controversy over the various grades of asphalt and their respective merits may be prolonged.

## The Trade in Brief

The Harrison-Walker Refractories Co., of Pittsburg, Pa., reports large and varied orders, received during the last two or three months, in the various departments covered by its products. The Bethlehem Steel Company has ordered all the refractory materials required for new furnace construction, an example followed by the New York State Steel Company, of Buffalo. A lengthy list includes brick, material for glass furnace construction, blast-furnace lining and other requirements. It may be noted that February orders were 25 per cent. larger in tonnage than those of January and nearly double the tonnage of September last.

The Hayden Automatic and Equipment Company, of 26 Cortlandt Street, New York, has secured orders for concrete block machinery for two important undertakings. In one case the Haworth Stone and Building Company, of Haworth, N. J., is to build an entire concrete village, including a club-house and about fifty bungalows. In the other, the Queens County Cement Construction Company will erect a number of concrete block dwellings on real estate at Richmond Hill, L. I. This company intends not only to erect these buildings, but to sell machine-made blocks for use in others.

The American la France Fire Engine Company has sold the city of Watertown, N Y., a second size Metropolitan steam fire engine, for which $5,492 will be paid, the price to include small repairs to another engine. The same firm secured an order for a first size Metropolitan engine, to be presented to the city of Watertown by Mrs. J. B. Taylor, daughter of Ex-Governor Flower. This engine is one of the most powerful fire fighters in the world and the citizens of Watertown are immensely pleased with the new equipment.

## A City Map

An unusually distinct street map of Dayton, Ohio, has been produced by Frederick J. Cellarius, Civil Engineer, of that city. It brings the topography of the city and adjacent areas up to the present year and includes a street index facilitating reference and search. The city wards are distinguished by colors and the location of "key-numbers" is given in a large number of streets.

## "How Not to Do It"

Under this caption we reproduced, on page 138 of The Municipal Journal and Engineer of February 7, certain comments made by *The American Architect* upon a method of school ventilation in New York. Mr. Frank G. McCann, engineer in charge of heating and ventilating and electric work in public schools of that city, has brought under our notice the circumstances under which some misleading statements were included in our contemporary's references and we note, in its issue of March 10, a letter from him, to which we now give

publicity, along with the editors' further comment, as affording the fullest exposition of Mr. McCann's views:

TO THE EDITORS OF THE AMERICAN ARCHITECT:

*Dear Sirs:—The American Architect* of January 27, 1906, had an editorial note criticising the ventilation in the New York City public schools, and from the wording of said article it is quite evident that no attempt was made to verify the statements made in the article, the result being that a false impression is given, which casts discredit on the city and causes parents to be afraid to send their children to school.

The article was, without doubt, based upon the letter sent to the New York *Times* by a graduate of said training-school, who was so anxious to create a sensation that she omitted part of the truth.

The facts of the case, which can easily be verified by a visit to the building (Public School 159, 119th Street, near Third Third Avenue, Manhattan) are as follows: The building has been occupied for several years by a teachers' training-school and a primary school in connection therewith.

Out of the thousands of young ladies trained in said building the Principal knows of only ten deaths since the school opened. Of these ten, two died during the summer vacation—one from accident (having fallen to death), and one from fever. Of the other eight, five were in the class of the aforementioned author, and as they are reported by her to have died from consumption all in one year, it is reasonable to suppose that they got their consumption from contagion and, from the absence of any other reported consumption deaths among the students of other years, it is almost unquestionable that the sanitary conditions in said school are so good that not only did said students not get their disease in said school, but that others were prevented from contracting the disease from the sick ones.

As to dust. If volumes of dust really soared to the fourth story windows, as reported, how would permission to open the windows better the conditions? Would not the dust enter the windows more easily than through the small air-spaces between the parts of heating stacks, through blower, ducts and wire screens?

The writer visited this building on the Monday morning after the letters appeared in *The Times*, and found a handful of newspapers lying in the court, *but no papers or other refuse* on the screens before the three fresh-air intakes.

Dust, like the poor, we have with us always, whether on street or indoors, else why should the good housewife need a broom and duster? But there is no visible dust entering the class-rooms in said building and the dust on the desks is mostly dust from the scuffling of feet of the forty to fifty pupils in each room and from the crayon used on blackboards.

It is an actual fact that the open windows permit the entrance of much more dust than is brought in by the warmed fresh air, delivered in quantity equal to thirty cubic feet per minute to each pupil, by means of blowers located in cellar. The air is taken in from four to eight feet above the pavement of the courts at a distance of at least sixty feet from street through wire screens, is heated to a temperature of from sixty-five to seventy-five degrees Fahrenheit to suit the outdoor conditions, and is delivered to the rooms through galvanized iron ducts and flues, with wire screens in the class-room openings. The vitiated air is forced out of the rooms through other flues gathering together into hoods above roof.

Several tests with Dr. Wolpert's testing device showed the amount of $CO_2$ present in the *vitiated* or outgoing air of the many class-rooms tried to be about seven to eight parts in ten thousand, which is very little more than is found in the surrounding outdoor air.

Smoke tests tried in several rooms showed that fresh air entering near ceiling traveled across the room, dropped to level of pupils, and then swept back around pupils and into the vent outlet, and the air in occupied portions of rooms was entirely changed in from five to six minutes, as was shown by the entire clearing out of smoke from the breathing space in that time after smoke tests started.

The system of ventilation used is the same as in the best modern theaters, except that as the air sent into the school rooms is heated only to the room temperature instead of being heated, as is done in theaters, to double the room temperature, the school room air is not overheated and made lifeless: but whoever suggests the opening of windows in a modern, high-class theater? Such a one would be laughed to scorn.

In regard to filtering the air before sending it into rooms, while such a procedure is entirely practicable and is often done where even the ordinary dust brought in through open windows is a source of trouble, as in a library or a department-store, making much dusting necessary, yet the very considerable expense entailed in the filtering of air is so serious a question that in a school-room, where much more dust is made by the occupants than could possibly be brought in by the air, it is believed by the best engineers (and is so stated by Professor R. C. Carpenter, in his text-book on heating and ventilation) that air filtering is inadvisable except in extreme cases.

As to taking air from so near the ground, it is sufficient to recall the fact that most of us, especially the school children, breathe air taken from a level lower than four feet whenever we walk or ride through our streets, and few of us filter such air before breathing it, yet it is a well-known fact that persons who are out of doors constantly are the healthiest. Can the air at breathing level be so very bad?

The entire question of ventilation of our schools arose from the fact that the principals of our schools misunderstood the intention of a circular letter sent to them regarding the opening of windows when "plenum (forced) ventilation" was in use, and from the fact that the majority of the janitors in charge of the schools did not understand how to regulate, or did not appreciate the necessity for regulating, the heating systems so that rooms would not be overheated by the direct radiators in the rooms.

The janitors seem to have relied upon the automatic (thermostatic) temperature-regulating devices installed in all class-rooms, but not in halls, toilets, etc. Unfortunately, automatic devices are not able to meet all conditions which may arise and, owing to our very mild weather this winter, the unassisted thermostats have been unable to cope with the situation. The halls, etc., where the janitors should give personal attention, have been allowed to get up to eighty-five and ninety degrees Fahrenheit, whereas they should be kept at about sixty-five degrees. The entire amount of direct radiation in class-rooms has been allowed to remain in service, where one-half the surface should have been shut off, not being needed except in really cold weather.

The heat of the bodies in rooms, the heat of the steam bottled up in radiators when the supply of steam in said radiators has been shut off automatically by the action of the thermostat, the heat of the sun beating into the windows and the heat from the overheated halls—all have acted to raise the room temperature from sixty-eight or seventy degrees Fahrenheit, at which the thermostat acted, to seventy-eight or eighty degrees Fahrenheit in many cases, and the *system* has been blamed, where, if it had been properly handled, everything would have been entirely satisfactory.

I do not blame the teachers for complaining under such conditions, and windows must needs be opened when temperature goes above seventy-four degrees Fahrenheit.

A second order was sent to the principals explaining that they did not go contrary to the rules governing them if they opened windows *when necessary*, but that such necessity should be at once reported to the Superintendent of School Buildings for correction. The system used in our buildings is not a patented system, but is the combination of direct radiation for heating and steel plate blowers delivering tempered air into all class-room for ventilation only. This is conceded by the most eminent engineers and architects to be the very best means of heating and ventilating school buildings.

In closing, I may add that the Chief Medical Inspector of the Brooklyn Board of Health visited a school similarly heated and ventilated, and after careful study of the conditions there existing, he reported in favor of the heating and ventilating system which we are installing in all new buildings of more than four class-rooms.

I have also to refer to an article which appeared last November in several of the heating trade papers, dealing with heating and ventilating in this country as viewed by a prominent English engineer, wherein he states that he visited many schools and theaters in many cities during a recent tour of the United States, and that, in his judgment, the schools of New York are the best ventilated and heated in this country. FRANK G. MCCANN.

[If we were disposed to be merely captious, we could suggest that the placing of the rights of the inanimate contents of libraries and department-stores on a higher plane than those of school-children is quite as grave a sanitary solecism as it is to argue that, because children carry dirt and dust into class-rooms on shoes and clothes and create it out of crumbled chalk, it is quite immaterial how much more "matter out of place" is introduced by improperly installed ventilating devices. Further, we could point out that when, in the open street, we meet a dust storm we turn our backs to it and do not wilfully inspire all that our nostrils can gather. We are glad to have Mr. McCann's explanation, although he fails to satisfy us that the fresh-air inlet in question is judiciously located.—Eds. Am. Architect.]

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HEAD LIGHTS ON THE CARS of the Natick and Cochituate Street Railway are the subject of a protest made to the Railroad Commissioners by the townspeople of Wellesley, Mass., who object to the confusing glare caused by beams thrown sometimes a quarter of a mile ahead. As speed is restricted to fifteen miles an hour in Wellesley, it was urged at the hearing that these search lights are unnecessary.

# AUTOMOBILES AND TRUCKS

## Now Used in Every Branch of Industry—The Atlas Truck Models—Construction and Equipment—Unique Features

The automobile and the automobile truck have come to stay. So uniformly successful have been the makers in perfecting numerous devices designed to give efficient service, that the use of the automobile has extended during recent years to almost every branch of industry. These vehicles, propelled by electric, gasoline or other power, are built in many sizes and are familiar sights in all large cities, being extensively used both for passenger and commercial purposes.

The Atlas trucks, having a carrying capacity of from 4,000 to 6,000 pounds, are excellent examples of these modern commercial vehicles. Manufactured by the Knox Motor Truck Company, Springfield, Mass., the Atlas trucks embrace in design and construction all that is calculated to combine economy in operation with durability and practical service. They differ materially in some respects from other types of vehicles, yet most satisfactory results are recorded. The simplicity of design forms a strong feature; the 24-horsepower gasoline engine, for instance, is placed close to its work and is direct connected with the driving axle by large spur gears. This engine is fitted with a double horizontal cylinder, 6-inch diameter, having a 7-inch stroke. This arrangement is similar to that used on trolley cars and allows the enclosing of the crankshaft, valveshaft and other transmission and compensatinggearing in the only case used in constructing the vehicle. All parts of the gearing are oiled from one supply.

ATLAS TRUCK—THE KNOX MOTOR CO.

Other features equally important in building trucks to withstand the wear and tear of continued use include the drop-forged steel I-beam axles, the throttle control lever on top of the steering wheel, the clutch and main brakes, which are operated by foot pedals, and the emergency brakes, operated by hand lever at the side. In all Atlas trucks the rear axle is so constructed that the load and road strains are taken by the outer trussed member, while the inner rotating driving axles connect the compensating gears and outer caps of the driving wheels, thus being subjected to the driving effort only.

The equipment of these trucks includes an odometer, oil lamps and parts of apparatus, besides wrenches, nuts and bolts. The trucks readily carry a 6,000 pound load up a 15 per cent. grade, even with a poor surface road, and they may be successfully run throughout the winter. There are two independent sets of brakes, operating on the inside and outside of large drums attached to the driving wheels, which are 36 inches in diameter. The average speed of Atlas trucks is 12 miles an hour, and the weight of the vehicles varies from 5,000 to 6,000 pounds.

### Steel Lockers the Best

To municipal officers, members of clubs and athletic associations, the troubles that arise from the use of lockers is a matter of frequent annoyance. Lack of ventilation renders it impossible to keep members' property in a dry and sanitary condition, and the difficulty of keeping a light wooden door securely locked sometimes makes it hard to keep one's property at all. Good fellowship in clubs should prevent complaints of unauthorized use of property unsecurely locked; thus steel lockers are the most satisfactory: they are dry, well ventilated and secure.

Steel lockers are an invention of manufacturers who make interior equipment racks for the care and classification of stock in factories and warehouses. Here compactness, saving floor space, convenience, permitting great detail in classification, fire-proof qualities, reducing insurance rates, combined with durability and portability, serve to make steel racks popular. Those acquainted with the almost endless detail of the hardware business and its allied trades will not be surprised to learn that steel racks are rapidly supplanting wooden racks. Those who desire more detailed information may be interested in reading the catalogue of the Lyon Manufacturing Company, for whom the Gardiner Manufacturing Company, of 136 Liberty street, are the New York City agents.

### Three Crocker-Wheeler Generators

Crocker-Wheeler Company, of Ampere, N. J., have recently received orders for three engine type alternating current generators to be installed by the towns of Dothan and Troy, Ala. The Dothan generators are of 100 and 200 KVA, 60 cycle, 3 phase, 2,300 volt. The third, of 150 KVA capacity, will be installed at Troy. The voltage cycles and phase of this machine are the same as those of the Dothan machines. All three to be direct connected to the engines. The town of Dothan has been using direct current for lighting, but owing to the rapid growth of the town, its officials have decided to use alternating current in order to transmit the current more economically over the increased area. The new generators give a total alternating current lighting capacity of 300 KVA.

# THE WEEK'S CONTRACT NEWS

**Relating to Municipal and Public Work—The Construction Field—Proposals and Contracts—Sewerage and Water Supply —Street Improvement and Lighting—Fire Equipment—Buildings**

## STREET IMPROVEMENTS

Wyland, Ala.—The people will vote on question of issuing street improvement bonds, April 16.

Ashland, Ky.—J. A. Meredith, Clerk, will open bids, April 9, for furnishing materials and constructing brick pavements, concrete curbing and gutters, as per plans. Approximate quantities: 69,000 square feet of brick on a concrete base; 36,000 square yards on either brick or concrete base, or bitulithic paving, and 38,000 lineal feet of concrete curb and gutter, with necessary catch basins.—J. W. Bostey, City Engineer.

Covington, Ky.—Scott street will be paved with creosote wood block, cement sidewalks will be laid on Martin street, and Ninth street will be graded, curbed and paved with brick.

Louisville, Ky.—Bids will be opened, April 6, for reconstructing Wenzel and Logan streets with vitrified block pavement.

Louisville, Ky.—Bids will be received, April 10, for paving Ealy street with macadam. A 20-foot roadway with brick gutters and a 5-foot granitoid sidewalk are specified.

Adrian, Mich.—The Council is arranging to pave several streets with brick.—James Blair.

Saurium, Mich.—The property owners of Heckla street are considering the use of brick or granitoid.

Joplin, Mo.—Bids will be received, April 10, for the purpose of issuing $5,000, 4 per cent. paving bonds.

Springfield, Mo.—An election will be held, April 6, to decide the question of issuing bonds for improving the streets.

Great Falls, Mont.—Central avenue will be paved with asphalt. Several sewers will be constructed.

Binghamton, N. Y.—Bids will be received, April 9, for paving Susquehanna street with brick; 2,742 square yards.

Brooklyn, N. Y.—Bids will be received, April 11, for paving with asphalt on concrete foundation Hopkinson avenue, Logan street, Norwood avenue and Eighth street.

Brooklyn, N. Y.—Bids will be received, April 11, for curbing and laying crosswalks on Belmont avenue, Avenue D, Dean street, Dumont avenue, Etna street, Foster avenue, Grant avenue and other streets.

New York, N. Y.—Bids will be received. April 11, for regulating, grading and paving several streets.—John F. Ahern, President, Borough of Manhattan.

Chillicothe, O.—The City Engineer has been instructed to prepare plans and specifications for paving Walnut street. Cement walks will also be constructed on Seventh and Main streets.

Cincinnati, O.—The Committee on Street and Parks has recommended improving Liberty street viaduct at a cost of $140,000.

Cleveland, O.—Coridge road will be widened, as well as paved, at a cost of $174,000. The Ohio Engineering Company has the contract.

Portsmouth, O.—Ordinances have been passed for paving Market, Fifth and John streets.—City Engineer Bryan.

Steubenville, O.—On April 14 bids will be opened for grading and macadamizing Skelly station free turnpike.—James Wherry, Commissioner.

Youngstown, O.—Property owners have agreed to pay half the cost of paving the Boulevard surrounding the park. Macadam, at cost of $36,000, or asphalt, at $54,000, will be laid.

Harrisburg, Pa.—Bids will be received, April 10, for building a road from Newcastle to Coal Town Crossroads.

Johnson City, Tenn.—The Council has decided to submit the question of issuing $12,000 paving bonds and $12,000 school bonds to a vote of the people.

Memphis, Tenn.—The Council has decided to pave portions of Poplar street with asphalt and macadam.—J. F. Hunter, Chairman, Citizens' Executive Committee.

Salt Lake, Utah.—Bids will be received, April 11, for the following street work: Asphalt pavement, 78,000 square yards; cement pavement, 1,400 square yards; curbing, 22,000 lineal feet; cement walks, four inches thick, 30,000 square feet.—Fred J. Leonard, Chairman, Board of Public Works; Louis C. Kelsey, City Engineer.

Roanoke, Va.—The City Engineer will open bids, April 14, for macadamizing and grading certain dirt streets, to cost approximately $30,000.—W. E. Thomas, City Clerk.

## SEWERS

New Britain, Conn.—Proposals will be received, April 10, for building sewers.—William H. Caldwell, City Engineer.

De Land, Fla.—The city is preparing to install a sewerage system; also a sewage disposal plant. Plans and estimates are desired.—V. W. Gould, Secretary, Board of Health, De Land, Fla.

Hattiesburg, Miss.—Proposals will be received, April 10, for sanitary and storm sewers.—Richard C. Huston, City Engineer.

Geneva, N. Y.—Sewers will be constructed on several streets—4,533 feet in all.

New York, N. Y.—Bids will be received, April 11, for sewers in Eleventh avenue, Convent avenue, Audubon avenue and West 152d street.—John F. Ahern, President, Borough of Manhattan.

Salt Lake, Utah.—Bids will be received, April 11, for constructing all pipe sewers required by the city up to October 31, 1906; approximate quantity, 77,000 lineal feet 8- to 12-inch sewers.—Fred J. Leonard, Chairman, Board of Public Works.

Roanoke, Va.—The contract for rebuilding Campbell avenue drain has been awarded by the City Council to C. Markley for $26,500.—W. E. Thomas, City Clerk.

Roanoke, Va.—Bids will be opened, April 14, for constructing sewers in Section 23, and parts of 8 and 21, West End; approximate cost, $22,000.—W. E. Thomas, City Clerk.

Waitsburg, Wash.—Estimates have been prepared for a sewer system; cost, $10,000. J. B. Wilson, Walla Walla, Engineer.

Beloit, Wis.—A large amount of sewer pipe will be laid during the season.—D. H. Foster, City Clerk.

Burlington, Wis.—Plans for a sewer system are being prepared by W. G. Kirchhoffer, Madison, Wis.

## WATER SUPPLY

Brundidge, Ala.—The Council has voted $12,000 waterworks bonds.

Atlanta, Ga.—A reservoir will be built at a cost of about $15,000.—R. M. Clayton, City Engineer.

Peoria, Ill.—The City Council is considering a proposition submitted by Albert Weiss and George H. Lucas to build new waterworks.

Hattiesburg, Miss.—Proposals will be received, April 10, for removing and replacing 11,000 feet of water pipe, and furnishing other supplies.—Richard C. Huston, City Engineer.

Orange, N. J.—Proposals for furnishing 20-inch cast-iron pipe and special castings will be received, April 9.—Fred T. Crane, City Engineer.

Yonkers, N. Y.—Bids will be received, April 5, by the Board of Water Commissioners, for erecting an 8,000,000-gallon pumping plant station.—A. W. Kingsbury, Clerk.

Massillon, O.—Legislation will be initiated for a bond issue to buy the waterworks plant and construct a new lighting plant.

Medina, O.—An ordinance to issue waterworks bonds for enlargement of the system has passed Council.—C. O. Van Duzen, City Clerk.

Mt. Vernon, O.—City Engineer Cureton estimates the cost of extension of waterworks system at $44,000; pipes, etc., $18,000; pump, $12,000; air compressor, $3,500. —City Engineer Cureton.

Salt Lake, Utah.—Bids will be received, April 11, for constructing all water mains up to October 31, 1906; 33,000 feet of mains six to ten inches will be required.—Fred J. Leonard, Chairman.

Emporia, Va.—The Greenville Water Power Company will advertise for bids for machinery to develop 4,000 H. P. on the Meherin river.

## PUBLIC LIGHTING

San Bernardino, Cal.—The Home Gas and Lighting Company has decided to issue $40,000 bonds for enlarging its gas plant.

Rockmart, Ga.—Bids will be received, April 9, for an electric light plant.—Jos. M. Rowman, City Engineer.

Rockford, Ill.—The Light Company will double the capacity of its plant.

Cannelton, Ind.—The City Council and the Electric Light Board have decided to rebuild the electric light building, recently destroyed by fire; estimated cost, $2,500.

Richmond, Ind.—The Richmond Light, Heat and Power Company will expend $45,000 for improvements. New boilers, costing $30,000, will be purchased.

Muskogee, I. T.—The City Council has granted a franchise to W. S. Reeves, A. W. Robb and others, to establish an electric-light plant.

Eldorado, Kan.—A franchise has been granted to P. B. Resler to establish a gas and electric-light plant.

Oberlin, Kan.—The city has voted $10,000 bonds for constructing an electric-light plant.

Covington, Ky.—A resolution has passed the Council for appointing an engineer to prepare plans and specifications for an electric-light plant.

North Attleboro, Mass.—An appropriation of $35,000 has been made for enlarging the municipal lighting plant.

Charlotte, Mich.—The citizens have voted to bond the city, $9,000, to secure the plant of the Standard Lamp Company of Chicago.

Chillicothe, Mo.—The citizens have voted $100,000 bonds for erecting and operating a municipal electric-lighting plant.

Maryville, Mo.—An election will be held in April to decide question of issuing $30,000 bonds for a municipal lighting plant.

Versailles, Mo.—Bonds, $5,000, have been issued to complete the electric-light plant.

Fairbury, Neb.—R. D. Russell and others have been granted a franchise to build a gas plant; estimated cost, $25,000 to $35,000.

Grand Island, Neb.—Bids will be received, April 16, for furnishing all the labor, equipment, material and supplies for installing a complete electric-light plant and lighting system.—W. K. Palmer, City Engineer.

Phelps, N. Y.—The citizens have voted to issue bonds for extending the lighting plant.

Galion, O.—Bids will be invited for an electric-lighting plant.

Marietta, O.—The County Commissioners expect to install an electric-lighting plant at the Court House.

Tecumseh, Okla.—The Council has accepted the plans of the O'Neill Engineering Company, Dallas, Tex., for installing a light and water plant; estimated cost, $60,000.

Danville, Pa.—Sealed proposals will be received at the State Hospital for an electric power plant. Plans may be obtained of Philip H. Johnson, Land Title Building, Philadelphia. Bids, April 10, to Dr. Levi I. Shoemaker, Chairman, Danville, Pa.

Kingstree, S. C.—An issue of bonds for an electric-lighting plant has been authorized.

Aberdeen, S. D.—The question of issuing $35,000 bonds for a municipal lighting plant will be voted on, April 6.

North Yakima, Wash.—George W. Wevlie is interested in developing a power plant at the Yakima river, for light and railway purposes.

Port Townsend, Wash.—John Siebenbaum and others have formed a company to install an electric-light plant.

## FIRE DEPARTMENT SUPPLIES

Pine Bluff, Ark.—The Council proposes to establish a fire station at Lakeside.

Monrovia, Cal.—The City Council will expend $62,000 for fire equipment.

Kendallville, Ind.—The Council proposes to establish a system of fire protection.

Shenandoah, La.—The Council recommends the purchase of 1,000 feet of hose, and other equipment for the Fire Department.

Jeffers, Minn.—A fire company is being organized.

Menahga, Minn.—The Council is considering the establishment of fire protection.

Miaca, Minn.—A fire company has been organized.

Dunkirk, N. Y.—The Council will shortly purchase 2,000 feet of hose.

New York, N Y.—On April 9, bids will be received for nozzles, valves, steam cocks, etc.—John H. O'Brien, Fire Commissioner.

Rensselaer, N Y.—The city will shortly invite bids for a hose house.

Lima, O.—Proposals will be received for $30,000 bonds for erecting a fire and police station.

Portsmouth, O.—The Council has appropriated $700 for equipment of two new fire systems.

St. Johns, Ore.—The Council is considering the purchase of a fire engine and apparatus, on account of a recent conflagration.

Swissvale, Pa.—Bonds, $70,000, have been issued for a Fire Department and street improvements.

Tyndall, S. D.—The Council proposes to establish a fire hall.

Hoquiam, Wash.—The Council will improve the fire protection system.

Toronto, Canada.—Bids will be received, May 1, for a supply of cast steel pipes for the high-pressure fire system.

## PUBLIC BUILDINGS

Alhambra, Cal.—An election will be held, April 12, to vote on issue of $35,000 school bonds.

Atwood, Kan.—An election will be held to decide question of issuing $30,000 bonds for erecting a Courthouse for Rawlins county.

Donaldsonville, La.—Bids for erecting a high school building in Ascension Parish, will be received April 11.—George B. Reuss, President, Department of Education.

Easton, Md.—The Legislature has authorized an issue of $10,000 school bonds.

Kalamazoo, Mich.—The citizens have voted $95,000 bonds for constructing a schoolhouse.

Virginia, Minn.—An election will be held to decide the question of issuing $40,000 school bonds.

Jackson, Miss.—Bonds, $20,000, for schools have been voted.

Springfield, Mo.—The citizens will vote, April 5, on question of issuing $20,000 school bonds.

Charlotte, N. Y.—The question of issuing $21,000 school bonds will be submitted to the voters, April 9.

Dayton, O.—Bonds, $150,000, have been issued for a new city building.

Massillon, O.—An election will be held to decide the question of issuing $70,000 bonds for a City Hall.

Mt. Vernon, O.—Bonds, $90,000, have been issued for additions to the Second and Fourth ward school buildings.

New Kensington, Pa.—Bids will be opened, April 9, for $5,750, 4 per cent., 30-year school bonds.—G. T. Lamon, Secretary, Board of Directors.

Eagle Pass, Texas.—The city has voted to issue $30,000, 5 per cent., 10 to 40-year school bonds.

Hillsboro, Texas.—The question of issuing bonds for erecting a schoolhouse will be submitted to a vote of the people.

Riverside, Texas.—An election will be held, April 20, to decide the question of issuing bonds for erecting a Courthouse.

Capeville, Va.—The city has received authority to issue school bonds.

Portsmouth, Va.—Schoolhouses will be built at Port Norfolk and Pinners Point at a cost of $12,500 and $18,000, respectively.

Milwaukee, Wis.—Bonds, $360,000, have been issued for school purposes.

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